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Nuclear Weapon Accident Response Procedures (NARP)

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FOREWORD

This Manual is issued under the authority of DoD Directive 3150.8 (reference (a)), and supersedes DoD 3150.8-M (reference (b)). While the National Response Plan (NRP) (reference (c))[1] was released on January 6, 2005, the current Federal Response Plan (FRP) and the Federal Radiological Emergency Response Plan (FRERP) (references (d) and (e)) remain in effect pending full NRP implementation. This edition of DoD 3150.8-M has been developed in conformance with references (d) and (e) and is in consonance with reference (c). It will serve as a bridging document until a new edition is developed under updated DoD guidance to meet the NRP requirements.

This Manual provides a concept of operations as well as functional information necessary to execute a comprehensive and unified response to a nuclear weapon accident. It provides information for planners and response elements to understand the overall response concept and roles the Department of Defense (DoD) and the Department of Energy/National Nuclear Security Administration (DOE/NNSA) assume as both Lead Federal Agency (LFA) and as a coordinating or cooperating agency under the NRP.

This Manual assumes that a radiological release has occurred because of a nuclear weapon accident and that consequence management operations are required. This edition of this Manual also provides information on site remediation (SR) activities after an accident involving a nuclear weapon. It does not detail all aspects of SR, but it does define a process by which response organizations may effectively face the challenge of SR. Crisis response operations to respond to a terrorist attack on a U.S. weapon are not addressed in this Manual.

This Manual provides a model response organization reflecting the philosophy and structure used by State and local responders nationwide. It identifies publications and resources used in response efforts, describes the policies and responsibilities outlined in the publications, identifies specific radiological information available in other publications, and provides a basis for developing detailed plans tailored to each Theater of Operations and Response Task Force (RTF) area of operations.

This Manual applies to the Office of the Secretary of Defense (OSD), the Military Departments, the Chairman of the Joint Chiefs of Staff, the Combatant Commands, the Office of the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities in the Department of Defense (hereafter referred to collectively as the "DoD Components"). The term "Military Services," as used herein, refers to the Army, the Navy, the Air Force, and the Marine Corps. The DOE/NNSA and other Federal Agencies may also use this Manual when operating with the Department of Defense.

[1] National Response Plan is available at http://www.dhs.gov/interweb/assetlibrary/NRP_FullText.pdf

Suggestions to update or improve this Manual are encouraged. Proposed changes may be submitted to the following address:

> The Office of the Deputy Assistant to the Secretary of Defense for Nuclear Matters
> 3050 Defense Pentagon
> Room 3C125
> Washington, D.C. 20301-3050

Additional copies of this manual may be downloaded from the Washington Headquarters Services Directives and Records Division web site at:

http://www.dtic.mil/whs/directives/corres/pub1.html.

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(ca) DoD Directive 5410.14, "Cooperation with U.S. News Media Representatives at the Scene of Military Accidents Occurring Outside Military Installations," October 25, 1963
(cb) Title 44, Code of Federal Regulations, Part 206, "Federal Disaster Assistance for Disasters on or After November 23, 1988," current edition
(cc) Chairman of the Joint Chiefs of Staff Instruction 3125.01, "Military Assistance to Domestic Consequence Management Operations in Response to a Chemical, Biological, Radiological, Nuclear, or High-Yield Explosive Situation," August 3, 2001
(cd) DoD Directive 5210.63, "Security of Nuclear Reactors and Special Nuclear Materials," April 6, 1990
(ce) Sections 331-2738 of title 10, United States Code
(cf) Amendment V. U.S. Constitution[13]
(cg) Sections 2671-2679 of title 28, United States Code
(ch) DoD Directive 5515.8, "Single-Service Assignment of Responsibility for Processing of Claims," June 9, 1990
(ci) Executive Order 11514, "Protection and Enhancement of Environmental Quality," March 7, 1970
(cj) Sections 1251-1386 and 2701-2761 of title 33, United States Code
(ck) Sections 1531-1544 of title 16, United States Code
(cl) Title 40, Code of Federal Regulations, Part 300, "Natural Oil and Hazardous Substance Pollution Contingency Plan," current edition
(cm) Executive Order 12580, "Superfund Implementation," January 23, 1987
(cn) DoD Directive 6050.7, "Environmental Effects Abroad of Major Department of Defense Actions," March 31, 1979
(co) Executive Order 12114, "Environmental Effects Abroad of Major Federal Actions," January 4, 1979
(cp) DoD Directive 5030.41, "Oil and Hazardous Substances Pollution Prevention and Contingency Program," June 1, 1977
(cq) DoD 4715.5-G, "Overseas Environmental Baseline Guidance Document," March 2000
(cr) DoD Instruction 4715.5, "Management of Environmental Compliance at Overseas Installations," April 22, 1996
(cs) DoD Directive 5030.14, "Disclosure of Atomic Information to Foreign Governments and Regional Defense Organizations," July 24, 1981
(ct) DoD Directive 5030.50, "Employment of Department of Defense Resources in Support of the United States Postal Service," April 13, 1972
(cu) DoD Directive 2000.12, "DoD Antiterrorism (AT) Program," August 18, 2003
(cv) DoD Instruction 2000.16, "DoD Antiterrorism Standards," June 14, 2001
(cw) DoD Directive 3020.36, "Assignment of National Security Emergency Preparedness (NSEP) Responsibilities to DoD Components," November 2, 1988
(cx) DoD Directive 5100.46, "Foreign Disaster Relief," December 4, 1975
(cy) DoD 5200.8-R, "Physical Security Program," May 1991
(cz) DoD Directive 5525.5, "DoD Cooperation with Civilian Law Enforcement Officials," January 15, 1986
(da) DoD Instruction 4000.19, "Interservice and Intragovernmental Support," August 9, 1995

[13] Available at http://www.archives.gov/national_archives_experience/charters/bill_of_rights_transcript.html

(db) DoD 3025.1-M, “DoD Manual for Civil Emergencies,” June 1994
(dc) Convention on Early Notification of a Nuclear Accident, November 5, 2002[14]
(dd) Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, November 5, 2002[15]
(de) Rio Declaration on Environment and Development, June 1972[16]
(df) Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention), May 1992[17]
(dg) Convention on Environmental Impact Assessment in a Transboundary Context, 1991[18]
(dh) Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Materials (1972 London Convention)[19]

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[14] Available at http://www.iaea.org/
[15] Ibid.
[16] Available at http://www.unep.org/Documents/Default.asp?DocumentID=78&ArticleID=1163
[17] Available at http://www.basel.int/text/con-e.htm
[18] Available at http://www.unece.org/env/eia/eia.htm
[19] Available at http://international.nos.noaa.gov/conv/london.html

DL1. DEFINITIONS

DL1.1.1. Access Procedures. See Explosive Ordnance Disposal (EOD) Procedures.

DL1.1.2. Access to Classified Material. The ability and opportunity to get knowledge of classified information. For access to classified information the following general restrictions apply:

DL1.1.2.1. Favorable determination of eligibility for access has been made by the Head of an Agency or his or her designee.

DL1.1.2.2. The person has signed an approved nondisclosure agreement; and

DL1.1.2.3. The person has a need to know the information.

DL1.1.3. Access to a Nuclear Weapon or Warhead. Close physical or electrical proximity to a nuclear weapon in such a manner as to allow the opportunity to tamper with or damage a nuclear weapon. For example, a person would not be considered to have access if an escort or a guard were provided for either the person or the weapon when the person is in close proximity to the weapon.

DL1.1.4. Access to Special Nuclear Material (SNM). Close physical proximity to nuclear reactors and/or SNM allowing the opportunity to tamper with, steal, or damage such items. Usually a person does not have access if an escort or guard is provided when the person is in close proximity to the reactor or SNM.

DL1.1.5. Accident Response Group (ARG). A DOE/NNSA asset comprised of technical and scientific experts, with specialized equipment. The ARG includes a cadre of senior scientific advisors, weapons engineers and technicians, experts in nuclear safety and high-explosive safety, health physicists, radiation control technicians, industrial hygienists, physical scientists, packaging and transportation specialists, and other specialists from the DOE/NNSA weapons complex. The ARG maintains readiness to provide DOE technical assistance to peacetime accidents involving SNM anywhere in the world.

DL1.1.6. Accident Scene. The area surrounding an Accident Site from which all non-essential personnel are evacuated. The accident scene is usually defined by the property boundaries of a U.S. Military reservation, base, or station and/or a National Defense Area (NDA) or National Security Area (NSA) established by the LFA. On foreign territory, the accident scene may be defined by the property boundaries of a U.S. or host nation military reservation, base, or station and/or a Weapon Restricted Area (WRA), Restricted Area (RA), or Safety and Security Zone (SSZ) established by on-scene host nation and U.S. authorities.

DL1.1.7. Accident Site. An area within the NDA, NSA, Weapon Storage Area, RA, or SSZ containing the affected weapon(s), warhead(s), SNM, and any potential damaged buildings, vehicles, and personnel property affected by the accident. Additionally, the accident site shall have response personnel, equipment, and resources necessary to control entry and access to the

affected area, and to plan and organize health and safety matters, weapons recovery, and other operations essential to the emergency.

DL1.1.8. Accident Site Consolidation. The third phase of the response to a nuclear weapon accident. It is marked by the arrival of a robust cadre of DoD and DOE/NNSA response assets to the accident site. It grows out of the initial response phase and begins once immediate lifesaving and firefighting activities are completed.

DL1.1.9. Accident Site Health Group (ASHG). A group of health and safety experts, staffed by representatives from the Department of Defense and the DOE/NNSA, shall ensure the health and safety of all on-site personnel during recovery from a nuclear weapon accident and all associated hazards, not just radiological hazards. The ASHG was formerly known as the Joint Hazard Evaluation Center.

DL1.1.10. Activity. Quantity of radioactive material that is transformed into a more stable element over a period of time. Unit of activity is a curie (Ci) or a Becquerel (Bq).

DL1.1.11. Aerial Measuring System (AMS). A DOE/NNSA asset consisting of fixed and rotary wing aircraft used to perform aerial radiation surveys and radioactive source searches which is able to confirm the release of radioactive materials into the atmosphere, track the radiation plume, and map the radioactive ground deposition.

DL1.1.12. Airborne Radioactivity. Any radioactive material suspended in the atmosphere.

DL1.1.13. Air Force Institute for Operational Health (AFIOH). A U.S. Air Force (USAF) unit that provides consultant, engineering, and analytical support in radiological, occupational, and environmental health programs.

DL1.1.14. Air Force Radiation Assessment Team (AFRAT). A field-qualified 37-person team of worldwide deployable health physicists, industrial hygienists, and laboratory technicians stationed at the Air Force Institute for Environmental, Safety, and Occupational Health Risk Analysis. Assets include a forward deployed field laboratory, supplemented by reach-back radioanalytical capability at Brooks Air Force Base (AFB), TX.

DL1.1.15. Air Sampler. A device used to collect the amounts of various pollutants or other substances in the air. As related to radiation, this device is used to collect radioactive particulates suspended in the air.

DL1.1.16. Airhead. A designated location in an area of operations used as a base for supply and evacuation by air.

DL1.1.17. Alpha Particle Radiation. A positively charged particle made up of two neutrons and two protons, emitted by certain radioactive nuclei. Alpha particles may be stopped by thin layers of light materials such as a sheet of paper or the outer layer of the exposed person’s skin and therefore pose no direct or external radiation threat. However, if internalized, they may pose a health risk.

DL1.1.18. Armed. The configuration of a nuclear weapon in which a single signal initiates the action for a nuclear detonation.

DL1.1.19. Armed Forces Radiobiology Research Institute (AFRRI). A tri-Service facility in Bethesda, MD, that conducts research in the field of radiobiology and related matters essential to the operational and medical support of the U.S. Department of Defense and the Military Services. The AFRRI provides the Medical Radiobiology Advisory Team (MRAT), and also provides educational courses such as, "The Medical Effects of Ionizing Radiation." (See http://www.afrri.usuhs.mil.)

DL1.1.20. Atmospheric Release Advisory Capability (ARAC). A DOE/NNSA asset for providing real-time computer modeling to assess events involving the release of hazardous radiological materials into the atmosphere.

DL1.1.21. Background Count. In connection with health protection, the contribution of background radiation to a measurement of radioactivity.

DL1.1.22. Background Radiation. The radioactive material in the environment, including both natural and a very small amount of manmade radioactive material. Nuclear (or ionizing) radiation arising from within the body and from the surroundings to which individuals are always exposed. It approximates 360 millirem (mRem) a year.

DL1.1.23. Becquerel (Bq). The International System unit of activity of a radionuclide, equal to the activity of a quantity of a radionuclide having one spontaneous nuclear transformation a second.

DL1.1.24. BENT SPEAR. The Joint Reporting Structure flagword for a Nuclear Weapon Incident. (See paragraph DL1.1.99., below).

DL1.1.25. Beta Particle Radiation. An electron or positron emitted by an atomic nucleus during radioactive decay. Beta radiation may be harmful depending on the dose and time of exposure and is easily shielded by aluminum.

DL1.1.26. Bioassay. The determination of type, quantity, concentration, and/or location of radioactive material in the body using either direct measurements of the body or analysis of biological material removed (blood, saliva) or excreted (feces, urine) from the body.

DL1.1.27. Biodosimetry. A laboratory method for determining a person's dose of ionizing radiation by analyzing certain components of the blood.

DL1.1.28. BROKEN ARROW. The Joint Reporting Structure Event and Incident Report flagword for a Nuclear Weapons Accident. (See paragraph DL1.1.98., below).

DL1.1.29. Close Proximity. Within 2 arms' reach or 6 to 7 ft of a weapon or SNM.

DL1.1.30. Consequence Management (CM). Actions and preparations taken before and during an accident or other emergent event to identify, organize, equip, and deploy emergency response forces to reduce the effects of such events on the public environment. CM includes the preparatory planning, training, and procurement of personnel and equipment capable of providing a national and international response in support of national and international security and public and environmental safety.

DL1.1.31. Contamination. The deposition and/or absorption of radioactive or other hazardous or toxic material on or by structures, areas, personnel, or objects.

DL1.1.32. Contamination Control. Procedures to avoid, reduce, remove, or render harmless, temporarily or permanently, nuclear or other hazardous or toxic materials contamination to maintain or enhance the efficient conduct of military operations.

DL1.1.33. Contamination Control Line (CCL). A line that initially extends 100 m beyond the known and/or suspected radiological contamination to provide a measure of safety. Once the Contamination Control Station (CCS) is operational, the CCL becomes the outer boundary that separates the reduced hazard area from the clean area.

DL1.1.34. Contamination Control Station (CCS). An area specifically designated for allowing ingress and egress of personnel and equipment to and/or from the Hazards Area. The outer boundary of the CCS is the CCL, and the inner boundary is the line segment labeled the hot line.

DL1.1.35. Continental United States (CONUS). U.S. territory, including the adjacent territorial waters, located in North America between Canada and Mexico.

DL1.1.36. Critical Nuclear Weapons Design Information (CNWDI). Top secret restricted data or secret restricted data revealing the theory of operation or design of the components of a thermonuclear or implosion-type fission bomb, warhead, demolition munition, or test device. Specifically excluded is information concerning arming, fusing, and firing systems; limited life components; and totally contained quantities of fissionable, fusionable, and high-explosive materials by type.

DL1.1.37. Cumulative Dose (Radiation). The total dose resulting from repeated exposure to radiation in the same region or of the whole body, including multiple exposures or internal doses delivered over time.

DL1.1.38. Curie (Ci). A unit of activity; the activity of a quantity of any radioactive nuclide undergoing 37 billion disintegrations a second; the amount of activity in 1 gram of radium.

DL1.1.39. Custody. The responsibility for the control of, transfer and movement of, and access to weapons and components. Custody also includes the maintenance of and accountability for weapons, components, and radioactive materials.

DL1.1.40. Decay (Radioactive). The spontaneous decrease in the radiation intensity or mass of any radioactive material with respect to time.

DL1.1.41. Decontamination. The process of making any person, object, or area safe within acceptable limits by absorbing, making harmless, or removing contaminated material clinging to or around it.

DL1.1.42. Decontamination Station. A building or location suitably equipped and organized where personnel and material are cleansed of radiological and other hazardous or toxic contaminants.

DL1.1.43. Dose. The amount of energy absorbed per unit mass of material, or the time integrated dose rate. Measured in units of gray (Gy) or radiation absorbed dose (RAD).

DL1.1.44. Dosimetry. The measurement of radiation dose. It applies to both the devices used (dosimeters) and to the techniques.

DL1.1.45. Emergency Management Team (EMT). The DOE Headquarters' (HQ) senior management team that coordinates and supports the departmental response to radiological emergencies.

DL1.1.46. Entry Control Point (ECP). The place where entry into and exit from the CCL, Security Station, NDA/NSA, or classified material working space is controlled. It is located on the disaster cordon near the on-scene control point.

DL1.1.47. Explosive Ordnance. All munitions containing explosives, nuclear fission or fusion materials, and biological and chemical agents. This ordnance includes bombs and warheads; guided and ballistic missiles; and artillery, mortar, rocket, and small arms ammunition. It also includes all mines, torpedoes, and depth charges; pyrotechnics; clusters and dispensers; cartridges and propellant actuated devices; electro-explosive devices; clandestine and improvised explosive device (IED); and all similar or related items or components that are explosive in nature.

DL1.1.48. Explosive Ordnance Disposal (EOD). The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded explosive ordnance. It may also include explosive ordnance which has become hazardous by damage or deterioration.

DL1.1.49. EOD Procedures. Those particular courses or modes of action taken by EOD personnel for access to, diagnosis, rendering safe, recovery, and final disposal of explosive ordnance or any Hazardous Material (HAZMAT) associated with an EOD incident.

DL1.1.49.1. Access Procedures. Those actions to locate exactly and gain access to unexploded ordnance.

DL1.1.49.2. Diagnostic Procedures. Those actions taken to identify and evaluate unexploded explosive ordnance.

DL1.1.49.3. Render Safe Procedures (RSPs). The part of the EOD procedures involving the application of special EOD methods and tools to interrupt functions or separate essential components of unexploded explosive ordnance to prevent an unacceptable detonation.

DL1.1.49.4. Recovery Procedures. Those actions taken to recover unexploded explosive ordnance.

DL1.1.49.5. Final Disposal Procedures. The final disposal of explosive ordnance which may include demolition or burning in place, removal to a disposal area, or other appropriate means.

DL1.1.50. EOD Unit. Personnel with special training and equipment who render explosive ordnance safe, make intelligence reports on such ordnance, and supervise the safe removal thereof.

DL1.1.51. Explosive Safety Quantity Distance (ESQD) Standards. Standards for the amounts and kinds of explosives that may be stored and the proximity of such storage to buildings, highways, railways, magazines, and other installations. These standards may be found in DoD 6055.9-STD (reference (g)).

DL1.1.52. Exposure. The level of radiation flux to which a material or living tissue is exposed. The actual dose of radiation from the exposure depends on many factors.

DL1.1.53. Federal Emergency Management Agency (FEMA). The Federal Agency within the Department of Homeland Security (DHS) which establishes policy and coordinates all civil defense and civil emergency planning, management, mitigation, and assistance functions of executive agencies in response to emergencies which require Federal response assistance. The FEMA assists State and local agencies in their emergency planning. Its primary role in a radiological accident is one of coordinating Federal, State, local, and volunteer response actions.

DL1.1.53.1. National Interagency Emergency Operations Center (NIEOC). The NIEOC is the location in the FEMA HQ in Washington, DC, from which the Emergency Support Team (EST) provides coordination support for Federal and State emergency response activities to a radiological accident or emergency.

DL1.1.53.2. Emergency Response Team. An interagency team, headed by the FEMA, deployed to a radiological emergency scene by the FEMA Director to make an initial assessment of the situation and then provide the FEMA's primary response capability.

DL1.1.53.3. EST. The FEMA HQ team that carries out notification activation and coordination procedures from the FEMA NIEOC. The EST obtains HQ coordination for Federal Agencies and supports staff of the FEMA Director and the Federal Coordinating Officer (FCO).

DL1.1.54. Federal Radiological Emergency Response Plan (FRERP) (reference(e)). The Federal plan to assist other Federal Agencies and State and local government officials in the response to a radiological emergency in the United States or its possessions and territories.

DL1.1.55. Federal Radiological Monitoring and Assessment Center (FRMAC). A coalition of all Federal resources that coordinates and manages the Federal off-site radiological monitoring and assessment activities during major radiological emergencies within the United States. The FRMAC works in support of State, local, and Tribal governments through the LFA.

DL1.1.56. Field Instrument for the Detection of Low-Energy Radiation (FIDLER). A field survey instrument specifically designed to measure low energy X-rays and gamma rays from weapons grade plutonium (Pu).

DL1.1.57. Film Badge. A photographic film packet or badge sometimes carried by non-U.S. personnel for measuring and recording gamma ray dosage permanently. Regularly replaced by Thermoluminescent Dosimetry.

DL1.1.58. Final Disposal Procedures. See EOD Procedures.

DL1.1.59. Follow-On Element. The emergency response element of a disaster response force that deploys to the accident scene after the initial response element to expand command and control (C2) and perform support functions.

DL1.1.60. Formerly Restricted Data. Information removed from the restricted data category when the DOE (or antecedent Agencies) and the Department of Defense jointly determine that such information relates primarily to the military use of atomic weapons and that such information may be adequately safeguarded as classified defense information. (Section 142d of the Atomic Energy Act (AEA) of 1954, as amended (reference (h))

DL1.1.61. Fragmentation Zone. A computed distance which fragments created by an explosion may be projected.

DL1.1.62. Gamma-Ray Radiation. High-energy electromagnetic radiation emitted from atomic nuclei during a nuclear reaction or radioactive decay. Gamma radiation requires thick layers of dense materials, such as lead, for shielding. Potentially lethal to humans, depending on the intensity of the field.

DL1.1.63. Geiger-Mueller (GM) Counter. A GM counter is a gas ionization type detector for gamma detection. They are most often used to detect beta and gamma rays. These counters are unable to distinguish gamma-ray energies and therefore may not be used to identify specific radionuclides.

DL1.1.64. Ground Radioactivity. An undesirable radioactive substance dispersed on the ground

DL1.1.65. Gray (Gy). A unit of absorbed dose of radiation. (One centigray (cGy) equals one RAD).

DL1.1.66. Half-Life. The time required for the activity of a given radioactive element to decrease to half of its initial value due to radioactive decay. The half-life is a characteristic

property of each radioactive element and is independent of its amount or physical form. The effective half-life of a given isotope in the body is the time in which the quantity in the body shall decrease to half because of both radioactive decay and biological elimination.

DL1.1.67. Hazard Prediction and Assessment Capability (HPAC). The HPAC is a forward deployable modeling capability available for government, government-related, or academic use. This software tool assists in emergency response to hazardous agent releases. Its fast running, physics-based algorithms enable users to model and predict hazard areas and human collateral effects in minutes. The HPAC is able to predict the effects of HAZMAT releases into the atmosphere and their impact on civilian and military populations.

DL1.1.68. Hazardous Material (HAZMAT). Any material that is flammable, corrosive, an oxidizing agent, explosive, toxic, poisonous, radioactive, nuclear, unduly magnetic, a chemical agent, biological research material, compressed gas, or any other material that, because of its quantity, properties, or packaging, may endanger life or property.

DL1.1.69. High Explosive (HE). An energetic material that detonates (instead of deflagrating or burning); the rate that the reaction zone advances into the unreacted material exceeds the velocity of sound in the unreacted material.

DL1.1.70. Hot Line. The inner boundary of the CCS, marked with tape or line. The station personnel consider the area on the inner side of the line as being contaminated and the side away from the accident as an area of reduced contamination.

DL1.1.71. Hot Spot. The region in a contaminated area in which the level of radioactive contamination is considerably greater than in neighboring regions in the area (about 10 times background).

DL1.1.72. Hotspot Health Physics Code. A fast, field-portable set of software modeling programs for evaluating events involving radioactive material. The software is also used for safety-analysis of facilities handling nuclear material.

DL1.1.73. Hotspot Mobile Laboratory. The Hotspot Mobile Laboratory is a DOE/NNSA emergency response capability that analyzes radiation samples for accidents involving nuclear weapons and radioactivity materials.

DL1.1.74. Incident Command System (ICS). A standardized on-scene emergency management concept specifically designed to allow its user(s) to adopt an integrated organizational structure equal to the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries.

DL1.1.75. Information Coordination Cell (ICC). A cell collocated with the On-Scene Commander (OSC) and his staff comprised of senior co-equal public affairs representatives from the Department of Defense, the DOE/NNSA, and State and local authorities. The ICC plans, manages, and coordinates the on-scene public affairs response.

DL1.1.76. Ingestion Pathway. The means by which a person is exposed to radiation through ingestion (i.e., hand-to-mouth).

DL1.1.77. Inhalation Pathway. The means by which a person at, or downwind from, the accident area is subjected to respiratory radiation exposure.

DL1.1.78. Initial Response Force (IRF). The DoD entity directed to proceed to the scene of a radiological accident or incident for rendering emergency assistance, including maintaining C2 of the accident site until relieved by the RTF. Subject to its capabilities, the IRF may be tasked to do the following:

DL1.1.78.1. Rescue operations.

DL1.1.78.2. Accident site security.

DL1.1.78.3. Firefighting.

DL1.1.78.4. Initiation of appropriate EOD procedures.

DL1.1.78.5. Radiation monitoring.

DL1.1.78.6. Establishing C2 and communications.

DL1.1.78.7. Public affairs activities.

DL1.1.78.8. Casualty Management

DL1.1.79. Insensitive High Explosive (IHE). HE that requires a shock of unusual strength to cause detonation. This relative insensitivity contributes to weapon safety.

DL1.1.80. Joint Communications Support Element (JCSE). Provides Chairman of the Joint Chiefs of Staff-directed contingency and crisis communications to meet operational and support needs of the Joint Chiefs of Staff, the Military Services, the Combatant Commands, the Defense Agencies, and the non-Defense Agencies.

DL1.1.81. Joint Director of Military Support (JDOMS). Plans for and commits DoD resources in response to requests from civil authorities, under DoD Directive 5101.1 (reference (i)). The JDOMS serves as the action agent for planning and executing the Department of Defense's support mission to civilian authorities within the United States.

DL1.1.82. Joint Information Center (JIC). A facility at the scene of a radiological accident or incident that coordinates all public affairs. The JIC includes representation from the DOE/NNSA; the Department of Defense; the FEMA; and other Federal, State, and local Agencies.

DL1.1.83. Joint Nuclear Accident Coordinating Center (JNACC). A combined Defense Threat Reduction Agency (DTRA) and DOE-centralized Agency for exchanging and maintaining information about radiological assistance capabilities and coordinating that assistance in response to an accident or incident involving radioactive materials.

DL1.1.84. Lead Federal Agency (LFA). The Agency that leads and coordinates all aspects of the Federal response and determines the type of emergency. When a Federal Agency owns, authorizes, regulates, or is otherwise considered responsible for the facility or radiological activity causing the emergency, and has authority to conduct and manage Federal actions on-site, that Agency is usually the LFA.

DL1.1.85. Maximum Permissible Dose. The radiation dose that a military commander or other appropriate authority may prescribe as the limiting cumulative radiation dose to be received over a specific period of time by members of the command, consistent with operational military considerations.

DL1.1.86. Medical Radiobiology Advisory Team (MRAT). A team from the AFRRI of highly qualified radiation medicine physicians, health physicists, and related scientists who provide state-of-the-art advice and assistance to the U.S. Combatant Commanders, allied forces, Federal Agencies, State and local governments, and others on radiological matters including accidents and incidents of nuclear weapons, nuclear reactors, radiological dispersal devices, and industrial and/or medical sources. The MRAT also provides expertise for managing and treating radiation casualties. The MRAT deploys as part of the DTRA Consequence Management Advisory Team (CMAT).

DL1.1.87. Monitoring. The act of detecting the presence of radiation and the measurement thereof with radiation measuring instruments.

DL1.1.88. National Atmospheric Release Advisory Capability (NARAC). A centralized computer-based system that estimates the transport, diffusion, and deposition of radioactive or other HAZMAT released to the atmosphere and projects doses to people and the environment.

DL1.1.89. National Communications System (NCS). The telecommunications system resulting from the technical and operational integration of the separate telecommunications systems of the several Executive Branch departments and Agencies having significant telecommunications capability.

DL1.1.90. National Defense Area (NDA). An area established on non-Federal or Federal lands located within the United States, its possessions, or its territories for safeguarding classified defense information or protecting DoD equipment and/or material. Establishment of an NDA temporarily places such lands under the effective control of the Department of Defense and results only from an emergency event. The senior DoD representative at the scene shall define the boundary, mark the boundary with a physical barrier, and post warning signs. The landowner’s consent and cooperation shall be obtained when possible; however, military necessity shall dictate the final decision on location, shape, and size of the NDA.

DL1.1.91. National Security Area (NSA). An area established on non-Federal or Federal lands located in the United States, its possessions, or its territories, for safeguarding classified information and/or restricted data or equipment and material belonging to the DOE/NNSA or the National Aeronautics and Space Administration (NASA). Establishment of an NSA temporarily places such lands under the effective control of the DOE/NNSA or the NASA and results only from an emergency event. The senior DOE/NNSA or NASA representative having custody of the material at the scene shall define the boundary, mark the boundary with a physical barrier, and post warning signs. The landowner's consent and cooperation shall be obtained when possible; however, operational necessity shall dictate the final location, shape, and size of the NSA.

DL1.1.92. Need-to-Know. A decision made by an authorized holder of classified information that a prospective recipient requires access to specific classified information to perform or assist in a lawful and authorized Governmental function.

DL1.1.93. Nuclear Component. Weapon components composed of fissionable or fusionable materials that contribute substantially to nuclear energy released during detonation.

DL1.1.94. Nuclear Contribution. Explosive energy released by nuclear fission or fusion reactions as part of the total energy released by a radiological accident. Any nuclear contribution equivalent to four or more pounds of trinitrotoluene (TNT) is considered significant and would add beta and gamma radiation hazards to other radiological and toxic hazards present at a radiological accident site.

DL1.1.95. Nuclear Detonation. A nuclear explosion resulting from fission or fusion reactions in nuclear materials, such as from a nuclear weapon.

DL1.1.96. Nuclear Radiation. Particulate and electromagnetic radiation emitted from atomic nuclei in various nuclear processes. The important nuclear radiations, from the weapons effects standpoint, are alpha and beta particles, gamma rays, and neutrons.

DL1.1.97. Nuclear Weapon. A complete assembly (i.e., implosion type, gun type, or thermonuclear type), in its intended ultimate configuration which, on completion of the prescribed arming, fusing, and firing sequence, is able to produce the intended nuclear reaction and release of energy.

DL1.1.98. Nuclear Weapon Accident (flagword BROKEN ARROW). An unexpected event involving nuclear weapons or radiological nuclear weapon components that results in any of the following (see DL1.1.28.):

DL1.1.98.1. Accidental or unauthorized launching, firing, or use by U.S. forces or U.S. supported allied forces of a nuclear-capable weapons system which might create the risk of an outbreak of war.

DL1.1.98.2. Nuclear detonation.

DL1.1.98.3. Non-nuclear detonation or burning of a nuclear weapon or radiological component.

DL1.1.98.4. Radioactive contamination.

DL1.1.98.5. Seizure, theft, loss, or destruction of a nuclear weapon or radiological nuclear weapon component, including jettisoning.

DL1.1.98.6. Public hazard, actual or implied.

DL1.1.99. Nuclear Weapon Incident (flagword BENT SPEAR). An unexpected event involving a nuclear weapon, facility, or component resulting in any of the following, but not constituting a nuclear weapon(s) accident (see DL1.1.24.):

DL1.1.99.1. An increase in the possibility of explosion or radioactive contamination.

DL1.1.99.2. Errors committed in assembling, testing, loading, or transporting equipment or the malfunctioning of equipment and materiel which might lead to an unintentional operation of all or part of the weapon arming or firing sequence which, in turn, might lead to a substantial change in yield, or increased dud probability.

DL1.1.99.3. Any act of God, unfavorable environment, or condition resulting in damage to the weapon, facility, or component.

DL1.1.100. Nuclear Yield. The energy released in the detonation of a nuclear weapon, measured in terms of the kilotons or megatons of TNT, required to produce an equivalent energy release.

DL1.1.101. Off Site. The area beyond the boundaries of a DoD installation or DOE facility, including the area beyond the boundary of an NDA or NSA, that has been or may become affected by a nuclear weapon accident.

DL1.1.102. On-Scene Commander (OSC). The OSC is the lead Federal official designated at the scene of the emergency to manage on-site activities and coordinate the overall Federal response to the emergency. When the Department of Defense is the LFA, the OSC is the IRF Commander until relieved by the RTF Commander. When the DOE/NNSA is the LFA, the OSC is the facility manager, site manager, or convoy commander that had custody of the weapon during the accident until relieved by the Senior Energy Official (SEO).

DL1.1.103. On-Site. The area established by the LFA as the NDA or NSA.

DL1.1.104. Operations Report (OPREP) -3 PINNACLE BROKEN ARROW. Report used to report a U.S. nuclear weapon accident that does not create risk of nuclear war. Included are the following:

DL1.1.104.1. Nuclear detonation of a U.S. nuclear weapon.

DL1.1.104.2. Non-nuclear detonation or burning of a nuclear weapon.

DL1.1.104.3. Radioactive contamination from a U.S. nuclear weapon or component.

DL1.1.104.4. The jettisoning of a U.S. nuclear weapon or component.

DL1.1.104.5. Public hazard, actual or implied, from a U.S. nuclear weapon or component.

DL1.1.105. Personal Protective Clothing. Clothing worn by response and recovery personnel that provides contamination protection. Clothing may consist of coveralls, shoe covers, cotton gloves, and hood or hair caps. Personal protective clothing protects the user from alpha-beta radiation but is primarily a control device to prevent the spread of contamination. A respirator may be worn with the personal protective clothing; this protects against the inhalation of contaminants.

DL1.1.106. Personnel Assurance Program (PAP). A program implemented for specifically tasked DOE personnel who handle, have access to, or control access to nuclear weapon systems. The program covers selection, screening, and evaluation of the personnel assigned to various nuclear duties. The program seeks to ensure that personnel coming under its purview are mentally and emotionally stable and reliable.

DL1.1.107. Personnel Reliability Program (PRP). A program implemented for all DoD personnel who control, handle, have access to, or control access to nuclear weapon systems, SNM, and Nuclear Command and Control (NC2) materials. The program covers selection, screening, and continuous evaluation of the personnel assigned to various nuclear duties. The program seeks to ensure that personnel coming under its purview are mentally and emotionally stable and reliable.

DL1.1.108. Physical Security. Elements of security concerned with physical measures designed to safeguard personnel and classified information; to prevent unauthorized access to nuclear weapons, SNM, and NC2 materials, equipment, facilities, and documents; and to safeguard them against espionage, sabotage, damage, and theft.

DL1.1.109. Plutonium (Pu) (acronym used in this Manual when referring to a formula). An artificially produced fissile material. The Pu-239 isotope is primarily used in nuclear weapons.

DL1.1.20. Protection Factors (PFs). The level of protection that a properly functioning respirator shall provide to a population of properly trained and fitted workers.

DL1.1.110. Protective Action Guide (PAG). A radiation exposure level or range established by appropriate Federal or State Agencies beyond which protective action should be considered.

DL1.1.111. Protective Action Recommendation (PAR). Advice to the State on emergency measures it should consider in deciding action for the public to take to avoid or reduce exposure to radiation.

DL1.1.112. Radiation Absorbed Dose (RAD). Commonly used unit of absorbed dose radiation. It has been replaced by cGy.

DL1.1.113. Radiation Emergency Assistance Center/Training Site (REAC/TS). A DOE/NNSA asset that provides 24-hour direct or consulting assistance to medical and health physics practitioners dealing with radiation-related health problems or injuries from local, national, or international radiation incidents.

DL1.1.114. Radioactivity. The spontaneous emission of radiation, usually alpha or beta particles, often accompanied by gamma rays from the nuclei of an unstable isotope.

DL1.1.115. Radioactivity Detection, Indication, and Computation (RADIAC). A term designating various types of radiological measuring instruments or equipment.

DL1.1.116. Radiological Accident. A loss of control over radiation or radioactive material that presents a hazard to life, health, property, or the environment, or that may result in any member of the general population exceeding limits for exposure to ionizing radiation.

DL1.1.117. Radiological Advisory Medical Team (RAMT). A U.S. Army, national asset DoD rapid response team specifically designed to provide timely expert guidance and services to the Combatant Commander, the OSC, and/or local medical authorities and provide limited medical support to response teams in controlled areas. In peacetime or war, the RAMT is capable of responding to a wide variety of events involving limited or mass nuclear casualties, radiologically contaminated patients, or exposed populations from events such as BROKEN ARROWs, reactor accidents, radiological terrorism, or nuclear war. The RAMT may deploy within 4 hours of notification and may operate in NSA, NDA, and CNWDI access areas.

DL1.1.118. Radiological Air Sampling Counting and Analysis Lab. A DOE/NNSA asset designed to provide rapid radioanalytical support for analyzing air filters and planchetts for the presence or absence of selected radionuclides from initial or resuspension actions because of accidental detonations.

DL1.1.119. Radiological Assistance. That assistance provided after an accident involving radioactive materials to:

DL1.1.119.1. Evaluate the radiological hazard.

DL1.1.119.2. Accomplish emergency rescue and first aid.

DL1.1.119.3. Reduce safety hazards to the public.

DL1.1.119.4. Reduce exposure of personnel to radiation of radioactive materials.

DL1.1.119.5. Reduce the spread of radioactive contamination.

DL1.1.119.6. Reduce damaging effects on property.

DL1.1.119.7. Issue technical information and medical advice to appropriate authorities.

DL1.1.120. Radiological Assistance Program (RAP) Team. A DOE/NNSA emergency asset that provides, on request, radiological assistance to DOE program elements; other Federal Agencies; State, local and Tribal governments; private groups; and individuals. RAP teams provide personnel and equipment to evaluate, assess, advise, and help lessen actual or perceived radiation hazards and risks to workers, the public, and the environment.

DL1.1.121. Radiological Control Area (RCA). The control area including all known, or suspected, radiological contamination at the site of a radiological accident.

DL1.1.122. Radiological Survey. The directed effort to determine the distribution of radiological material and exposure rates in an area.

DL1.1.123. Recovery Procedures. See EOD Procedures.

DL1.1.124. Re-Entry Recommendations (RERs). Advice provided to the State on guidance that may be issued to members of the public on returning to an area affected by a radiological emergency, either permanently or for short-term emergency actions.

DL1.1.125. Remediation Cell (RC). An ad hoc group comprised of environmental specialists formed to propose plans for SR.

DL1.1.126. Render Safe Procedures (RSPs). See EOD Procedures.

DL1.1.127. Response Task Force (RTF). A DoD response force appropriately staffed, trained, and equipped to coordinate all actions necessary to control and recover from a radiological accident. The specific purpose of the RTF is to recover weapons and provide radiological accident assistance. RTFs are organized and maintained by those Combatant Commanders whose Component Commands have custody of nuclear weapons or radioactive nuclear weapon components.

DL1.1.128. Restricted Data. All data (information) concerning the following:

DL1.1.128.1. The design, manufacture, or use of atomic weapons.

DL1.1.128.2. The production of SNM; or

DL1.1.128.3. The use of SNM in the production of energy, but not including data declassified or removed from the restricted data category under Section 142 of the AEA. (reference (h))

DL1.1.129. Roentgen (R). A unit of exposure of gamma (or X-ray) radiation in field dosimetry.

DL1.1.130. Roentgen Equivalent Man/Mammal (REM). A derived unit equal to the absorbed dose in humans multiplied by a quality factor, which accounts for the average effectiveness of a particular type of radiation in producing biological effects in humans. (1 REM = 0.01 sieverts (Sv)).

DL1.1.131. Safing. As applied to weapons and ammunition, the changing from a state of readiness for initiation to a safe condition.

DL1.1.132. Second-Order Closure Integrated Puff (SCIPUFF). SCIPUFF is the transport model used within the HPAC model to predict the expected dispersion on Nuclear, Biological, and Chemical (NBC) materials and associated uncertainties. SCIPUFF takes the release scenarios (what, where, when, and the boundaries of the specific environmental data), predicts where the NBC material shall move through the atmosphere, and computes the deposition of the HAZMAT at geographic locations.

DL1.1.133. Security Area. The area surrounding the accident site in an overseas country where a two-person security policy is established to prevent unauthorized access to classified defense information, equipment, or material. The cooperation by local authorities and host nation consent should be obtained through prior host nation agreements. In some countries, this area may be designated as the “Weapon Restricted Area,” WRA, or RA, in accordance with bilateral or Combatant Commander plans.

DL1.1.134. Senior Defense Official (SDO). The Official who supports the OSC by managing DoD emergency response assets during a nuclear weapon accident when the Department of Defense is the LFA. When the Department of Defense is not the LFA, the SDO is responsible for C2 and coordination of DoD emergency response assets to support the OSC. The SDO serves as the DoD senior spokesperson when the Department of Defense is not the LFA.

DL1.1.135. Senior Energy Official (SEO). The Official who provides C2 and coordination of all DOE/NNSA emergency response assets that may be called to lessen the results of the nuclear weapons accident. The SEO is the focal point for interfacing with the Department of Defense and other Agencies and represents the DOE/NNSA at the accident site for all Departmental response operations, including serving as the senior spokesperson for the DOE/NNSA.

DL1.1.136. Sievert (Sv). International System unit of any of the quantities expressed as dose equivalent. The dose equivalent in Svs is equal to the absorbed dose in Gys multiplied by the quality factor (1 Sv = 100 REM).

DL1.1.137. Site Remediation (SR). The process of removing contaminants from a site that were the result of an accident and restoring the site to conditions agreed on by the stakeholders.

DL1.1.138. Site Remediation Working Group (SRWG). An organization formed at the accident scene whose sole purpose is to focus on SR issues. The SRWG draws on the expertise of the various elements who respond to the accident to form a coordinated SR team.

DL1.1.139. Special Nuclear Material (SNM). Plutonium and uranium enriched in the 238 or 235 isotope, respectively, and any other material that the DOE, under the provisions of Section 51 of the AEA (reference (h)), determines to be SNM. Does not include source material.

DL1.1.140. Triage. The process for sorting injured people into groups based on their need for, or likely benefit from, immediate medical treatment. More generally, a process in which things are ranked in terms of importance or priority.

DL1.1.141. Tritiated Water (HTO). A water molecule in which a tritium (T or H-3) atom replaces a hydrogen atom.

DL1.1.142. Tritium (T or H-3) (acronym used in this Manual when referring to a formula). Tritium is a radioactive isotope of hydrogen having one proton and two neutrons in the nucleus. Tritium is a low energy beta emitter that, when in oxide form (HTO) poses a radiation hazard from inhalation and absorption through intact skin.

DL1.1.143. Tuballoy. A term of British origin for uranium metal containing Uranium (U)-238 and U-235 in natural proportions; therefore, the term is considered ambiguous, and its use is discouraged. This term is sometimes applied to depleted uranium (DU).

DL1.1.144. Two-Person Concept. A system designed to prohibit access by one individual to nuclear weapons and certain designated components by requiring the presence at all times of at least two authorized persons capable of detecting incorrect or unauthorized procedures with respect to the task to be performed. Also referred to as the two-person rule or policy. Replaced the two-man rule.

DL1.1.145. Two-Person Control. The close surveillance and control of materials at all times by at least two authorized persons, each capable of detecting incorrect or unauthorized procedures with respect to the task to be performed and each familiar with established security requirements.

DL1.1.146. Unified Command. In ICS, the Unified Command is a unified team effort which allows all agencies with responsibility for the incident, either geographic or functional, to manage an incident by establishing a common set of incident objectives and strategies. This is accomplished without losing agency authority, responsibility, or accountability.

DL1.1.147. Uranium (U) (acronym used in this Manual when referring to a formula). Uranium is a heavy, silvery white, radioactive metal. In air, the metal becomes coated with a layer of oxide that makes it appear from a golden-yellow color to almost black. Uranium is an alpha emitter. Decay (daughter) products emit an array of other radiations. Uranium presents chemical and radiation hazards and exposure may occur during mining, ore processing, or uranium metal production. Uranium and its compounds have both toxic chemical and radiation

effects, depending on dose and exposure time, as well as type of exposure, such as inhalation or skin contact.

DL1.1.148. Warhead. That part of a missile, projectile, torpedo, rocket, or other munitions that contains the nuclear or thermonuclear system, HE system, chemical or biological agents, or inert materials intended to inflict damage.

DL1.1.149. Weapon Debris (Nuclear). The residue of a nuclear weapon after it has exploded or burned; that is, the materials used for the casing and other components of the weapon, plus unexpended plutonium or uranium, together with fission products, if any.

DL1.1.150. Weapons Recovery. Includes a comprehensive assessment of the accident, neutralizing the weapon hazards, and removing, packaging, and shipping of the weapon hazard

AL1. ABBREVIATIONS AND/OR ACRONYMS

AL1.1.1.	AAC	Ambient Air Concentration
AL1.1.2.	ACC	Air Combat Command
AL1.1.3.	ACE	Allied Command Europe
AL1.1.4.	AE	Aeromedical Evacuation
AL1.1.5.	AEA	Atomic Energy Act
AL1.1.6.	AFB	Air Force Base
AL1.1.7.	AFI	Air Force Instruction
AL1.1.8.	AFIOH	Air Force Institute for Operational Health
AL1.1.9.	AFMAN	Air Force Manual
AL1.1.10.	AFRAT	Air Force Radiation Assessment Team
AL1.1.11.	AFRRI	Armed Forces Radiobiology Research Institute
AL1.1.12.	AIB	Accident Investigation Board
AL1.1.13.	Am	Americium (acronym used when referring to a formula)
AL1.1.14.	AMAD	Activity Median Aerodynamic Diameter
AL1.1.15.	AMS	Aerial Measuring System
AL1.1.16.	AN/PDQ	Army, Navy/Portable, RADIAC, Special or Combination
AL1.1.17.	AN/PDR	Army, Navy/Portable Detector Radiation
AL1.1.18.	AN/VDR	Army, Navy/Vehicular (Ground), RADIAC, Passive Detecting
AL1.1.19.	AOR	Area of Responsibility
AL1.1.20.	ARAC	Atmospheric Release Advisory Capability
AL1.1.21.	ARG	Accident Response Group
AL1.1.22.	ASD(NII)	Assistant Secretary of Defense (Networks and Information Integration)
AL1.1.23.	ASD(PA)	Assistant Secretary of Defense (Public Affairs)
AL1.1.24.	ASD(SO/LIC)	Assistant Secretary of Defense (Special Operations and Low Intensity Conflicts)
AL1.1.25.	ASHG	Accident Site Health Group
AL1.1.26.	ATSD(NCB)	Assistant to the Secretary of Defense For Nuclear and Chemical and Biological Defense Programs
AL1.1.27.	BAT	Biodosimetry Assessment Tool
AL1.1.28.	BEEF	Base Engineer Emergency Forces
AL1.1.29.	BGP	Beta Gamma Probe
AL1.1.30.	Bq	Becquerel
AL1.1.31.	BUMED	Navy Bureau of Medicine and Surgery
AL1.1.32.	C2	Command and Control
AL1.1.33.	CAT	Crisis Action Team
AL1.1.34.	CBRNE	Chemical, Biological, Radiological, Nuclear, or High-Yield Explosive
AL1.1.35.	CCA	Contamination Control Area
AL1.1.36.	CCATT	Critical Care Air Transport Team
AL1.1.37.	CCG	Crisis Coordination Group
AL1.1.38.	CCL	Contamination Control Line
AL1.1.39.	CCS	Contamination Control Station

AL1.1.40.	CDC	Center for Disease Control and Prevention
AL1.1.41.	CDO	Command Duty Officer
AL1.1.42.	CEDE	Committed Effective Dose Equivalent
AL1.1.43.	CF	Composite Fiber
AL1.1.44.	CFM	Cubic Feet per Minute
AL1.1.45.	CG	Commanding General
AL1.1.46.	cGy	CentiGray
AL1.1.47.	Ci	Curie
AL1.1.48.	CIB	Combined Information Bureau
AL1.1.49.	CKHV	High Volume Calibration Kit
AL1.1.50.	CM	Consequence Management
AL1.1.51.	CMAT	Consequence Management Advisory Team
AL1.1.52.	CMHT	Consequence Management Home Team
AL1.1.53.	CMPT	Consequence Management Planning Team
AL1.1.54.	CMRT	Consequence Management Response Team
AL1.1.55.	CMST	Consequence Management Support Team
AL1.1.56.	CNWDI	Critical Nuclear Weapon Design Information
AL1.1.57.	CO	Commanding Officer
AL1.1.58.	COM	Chief of Mission
AL1.1.59.	COMSEC	Communications Security
AL1.1.60.	CONUS	Continental United States
AL1.1.61.	CPM	Counts per Minute
AL1.1.62.	DAC	Derived Air Concentration
AL1.1.63.	DCFs	Dose Conversion Factors
AL1.1.64.	DCO	Disaster Control Office
AL1.1.65.	DEPSECDEF	Deputy Secretary of Defense
AL1.1.66.	DFO	Disaster Field Office
AL1.1.67.	DHS	Department of Homeland Security
AL1.1.68.	DII	Defense Information Infrastructure
AL1.1.69.	DNWS	Defense Nuclear Weapons School
AL1.1.70.	DOE	Department of Energy
AL1.1.71.	DOE/NV	Department of Energy, Nevada
AL1.1.72.	DOI	Department of the Interior
AL1.1.73.	DOS	Department of State
AL1.1.74.	DOT	Department of Transportation
AL1.1.75.	DPM	Disintegrations per minute
AL1.1.76.	DSN	Defense Switched Network
AL1.1.77.	DT	Detecting Head
AL1.1.78.	DTPA	Diethylenetriamine Pentaacetic Acid
AL1.1.79.	DTRA	Defense Threat Reduction Agency
AL1.1.80.	DTRA/CSEO	DTRA Operations Center
AL1.1.81.	DU	Depleted Uranium
AL1.1.82.	DWC	Domestic Warning Center
AL1.1.83.	ECN	Emergency Communications Network
AL1.1.84.	ECP	Entry Control Point
AL1.1.85.	EEFI	Essential Elements of Friendly Information

AL1.1.86.	EMEDS	U.S. Air Force Expeditionary Medical Support
AL1.1.87.	EMS	Emergency Medical Services
AL1.1.88.	EMT	Emergency Management Team
AL1.1.89.	E.O.	Executive Order
AL1.1.90.	EOC	Emergency Operations Center
AL1.1.91.	EOD	Explosive Ordnance Disposal
AL1.1.92.	EPA	Environmental Protection Agency
AL1.1.93.	ERO	Emergency Response Officer
AL1.1.94.	ESC	Executive Support Center
AL1.1.95.	ESQD	Explosive Safety Quantity Distance
AL1.1.96.	EST	Emergency Support Team
AL1.1.97.	EUCOM	European Command
AL1.1.98.	FBI	Federal Bureau of Investigation
AL1.1.99.	FCO	Federal Coordinating Officer
AL1.1.100.	FDA	Food and Drug Administration
AL1.1.101.	FDPMU	U.S. Navy Forward Deployable Preventive Medicine Unit
AL1.1.102.	FEMA	Federal Emergency Management Agency
AL1.1.103.	FIDLER	Field Instrument for the Detection of Low Energy Radiation
AL1.1.104.	FM	Frequency Modulation
AL1.1.105.	FRERP	Federal Radiological Emergency Response Plan
AL1.1.106.	FRMAC	Federal Radiological Monitoring and Assessment Center
AL1.1.107.	FRP	Federal Response Plan
AL1.1.108.	FRPCC	Federal Radiological Preparedness Coordinating Committee
AL1.1.109.	FS	Feasibility Study
AL1.1.110.	GC	General Counsel
AL1.1.111.	GI	Gastrointestinal
AL1.1.112.	GM	Geiger-Mueller
AL1.1.113.	GPS	Global Positioning System
AL1.1.114.	GSA	General Services Administration
AL1.1.115.	Gy	Gray
AL1.1.116.	H-3 (T)	Tritium
AL1.1.117.	HAZMAT	Hazardous Material
AL1.1.118.	HE	High Explosive
AL1.1.119.	HEPA	High Efficiency Particulate Air
AL1.1.120.	HEU	Highly Enriched Uranium
AL1.1.121.	HF	High Frequency
AL1.1.122.	HHS	Department of Health and Human Services
AL1.1.123.	HPAC	Hazard Prediction and Assessment Capability
AL1.1.124.	HQ	Headquarters
AL1.1.125.	HQ/EOC	DOE HQ Emergency Operations Center
AL1.1.126.	HTO	Tritiated Water
AL1.1.127.	HUD	Housing and Urban Development
AL1.1.128.	IC	Inhaled Concentration
AL1.1.129.	ICC	Information Coordination Cell
AL1.1.130.	ICRP	International Commission on Radiological Protection
AL1.1.131.	ICS	Incident Command System

AL1.1.132.	IED	Improvised Explosive Devices
AL1.1.133.	IHE	Insensitive High Explosive
AL1.1.134.	IM	Intensity Measuring (device)
AL1.1.135.	INMARSAT	International Marine Satellite
AL1.1.136.	IRF	Initial Response Force
AL1.1.137.	ISD	Instructional Systems Development
AL1.1.138.	IV	Intravenous; intravenously
AL1.1.139.	J-3	Joint Staff, Directorate of Operations
AL1.1.140.	JCSE	Joint Communications Support Element
AL1.1.141.	JDOMS	Joint Director of Military Support
AL1.1.142.	JFCOM	Joint Forces Command
AL1.1.143.	JIC	Joint Information Center
AL1.1.144.	JNACC	Joint Nuclear Accident Coordinating Center
AL1.1.145.	JNAIRT	Joint Nuclear Accident/Incident Response Team
AL1.1.146.	JOC	Joint Operations Center
AL1.1.147.	JSCC	Joint Security Control Center
AL1.1.148.	JTF-CS	Joint Task Force Civil Support
AL1.1.149.	JTS	Joint Training System
AL1.1.150.	keV	Thousand Electron Volts
AL1.1.151.	LAM	Local Area Monitoring
AL1.1.152.	LFA	Lead Federal Agency
AL1.1.153.	LLNL	Lawrence Livermore National Laboratory
AL1.1.154.	LNO	Liaison Officer
AL1.1.155.	MBq	Megabequerel
AL1.1.156.	mCi	Millicuries
AL1.1.157.	µCi	Microcuries
AL1.1.158.	$\mu Ci/m^3$	Microcuries per cubic meter
AL1.1.159.	$\mu Ci/m^2$	Microcuries per meter squared
AL1.1.160.	$\mu g/m^2$	Microgram per meter squared
AL1.1.161.	µR	Microroentgen
AL1.1.162.	MeV	Million Electron Volts
AL1.1.163.	MDS	Meteorological Data Servers
AL1.1.164.	MPC	Maximum Permissible Concentration
AL1.1.165.	MPE	Maximum Permissible Exposure
AL1.1.166.	mph	Miles per hour
AL1.1.167.	mR	Milliroentgen
AL1.1.168.	mRem	Millirem
AL1.1.169.	MRAT	Medical Radiobiological Advisory Team (AFRRI)
AL1.1.170.	NaI	Sodium Iodide
AL1.1.171.	NARAC	National Atmospheric Release Advisory Capability
AL1.1.172.	NARMC	North Atlantic Regional Medical Command
AL1.1.173.	NASA	National Aeronautics and Space Administration
AL1.1.174.	NATO	North Atlantic Treaty Organization
AL1.1.175.	NBC	Nuclear, Biological, and Chemical
AL1.1.176.	NC2	Nuclear Command and Control
AL1.1.177.	NCS	National Communications System

AL1.1.178.	NDA	National Defense Area
AL1.1.179.	NIEOC	National Interagency Emergency Operations Center
AL1.1.180.	NIMS	National Incident Management System
AL1.1.181.	NL	No Limit
AL1.1.182.	NMCC	National Military Command Center
AL1.1.183.	NNSA	National Nuclear Security Administration
AL1.1.184.	NORTHCOM	U.S. Northern Command
AL1.1.185.	NRC	Nuclear Regulatory Commission
AL1.1.186.	NRP	National Response Plan
AL1.1.187.	NSA	National Security Area
AL1.1.188.	NSN	National Stock Numbers
AL1.1.189.	NWOC	Nuclear Weapons Orientation Course
AL1.1.190.	OCONUS	Outside Continental United States
AL1.1.191.	OOD	Officer of the Deck
AL1.1.192.	OPREP	Operations Report
AL1.1.193.	OPSEC	Operation Security
AL1.1.194.	OSC	On-Scene Commander
AL1.1.195.	OSD	Office of the Secretary of Defense
AL1.1.196.	PA	Preliminary Assessment
AL1.1.197.	PACOM	Pacific Command
AL1.1.198.	PAG	Protective Action Guide
AL1.1.199.	PAO	Public Affairs Officer
AL1.1.200.	PAP	Personnel Assurance Program
AL1.1.201.	PAR	Protective Action Recommendation
AL1.1.202.	pCi	Picocurie
AL1.1.203.	PF	Protection Factor
AL1.1.204.	PIN	Personal Identification Number
AL1.1.205.	PLA	Principal Legal Advisor
AL1.1.206.	POL	Petroleum, Oil, and Lubricants
AL1.1.207.	PPE	Personal Protective Equipment
AL1.1.208.	PRP	Personnel Reliability Program
AL1.1.209.	PSA	Public Service Announcement
AL1.1.210.	Pu	Plutonium (acronym used when referring to a formula)
AL1.1.211.	QC	Quality Control
AL1.1.212.	R	Roentgen
AL1.1.213.	RA	Restricted Area
AL1.1.214.	RAD	Radiation Absorbed Dose
AL1.1.215.	RADCON	Radiological Control
AL1.1.216.	RADIAC	Radioactivity Detection, Indication, and Computation
AL1.1.217.	RAMT	Radiological Advisory Medical Team (U.S. Army)
AL1.1.218.	RAP	Radiological Assistance Program
AL1.1.219.	RC	Remediation Cell
AL1.1.220.	RCA	Radiological Control Area
AL1.1.221.	RCO	Regional Coordinating Office
AL1.1.222.	REAC/TS	Radiation Emergency Assistance Center/Training Site
AL1.1.223.	REM	Roentgen Equivalent Man/Mammal

AL1.1.224.	RER	Re-Entry Recommendation
AL1.1.225.	RF	Resuspension Factor
AL1.1.226.	RI	Remedial Investigation
AL1.1.227.	RMAC	Radiological Monitoring and Assessment Center
AL1.1.228.	RSP	Render Safe Procedure
AL1.1.229.	RTF	Response Task Force
AL1.1.230.	RUF	Rules for Use of Force
AL1.1.231.	SCBA	Self-Contained Breathing Apparatus
AL1.1.232.	SCIPUFF	Second-Order Closure Integrated Puff
AL1.1.233.	SDO	Senior Defense Official
AL1.1.234.	SECDEF	Secretary of Defense
AL1.1.235.	SEO	Senior Energy Official
AL1.1.236.	SI	Site Inspection
AL1.1.237.	SNL	Sandia National Laboratories
AL1.1.238.	SNM	Special Nuclear Material
AL1.1.239.	SOI	Signal Operating Instruction
AL1.1.240.	SR	Site Remediation
AL1.1.241.	SRWG	Site Remediation Working Group
AL1.1.242.	SSZ	Safety and Security Zone
AL1.1.243.	STU	Secure Telephone Unit
AL1.1.244.	Sv	Sievert
AL1.1.245.	T (or H-3)	Tritium (acronym used when referring to a formula)
AL1.1.246.	Th	Thorium (acronym used when referring to a formula)
AL1.1.247.	TLD	Thermo-Luminescent Dosimeter
AL1.1.248.	TNT	Trinitrotoluene
AL1.1.249	TRI-TAC	Tri-Service Tactical
AL1.1.250.	U	Uranium (acronym used when referring to a formula)
AL1.1.251.	UCT	Universal Coordinated Time
AL1.1.252.	UHF	Ultra High Frequency
AL1.1.253.	USAF	United States Air Force
AL1.1.254.	U.S.C.	United States Code
AL1.1.255.	USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics
AL1.1.256.	USD(I)	Under Secretary of Defense For Intelligence
AL1.1.257.	USD(P)	Under Secretary of Defense For Policy
AL1.1.258.	USDA	U.S. Department of Agriculture
AL1.1.259.	USG	United States Government
AL1.1.260.	UTC	Unit Type Code
AL1.1.261.	VHF	Very High Frequency
AL1.1.262.	WATS	Wide Area Telephone Service
AL1.1.263.	WBGT	Wet Bulb Globe Temperature
AL1.1.264.	WMD	Weapon of Mass Destruction
AL1.1.265.	WRA	Weapon Restricted Area
AL1.1.266.	WRAMC	Walter Reed Army Medical Center
AL1.1.267.	WRSET	Weapon Recovery Safety Evaluation Team
AL1.1.268.	ZnS	Zinc Sulfur

C1. CHAPTER 1

INTRODUCTION

C1.1. REISSUANCE AND PURPOSE

In addition to the purpose stated in the Foreword of this Manual, this Manual outlines the current policies and planning that set forth the responsibilities and procedures for DoD forces and provides information for the DOE/NNSA when preparing for and responding to a nuclear weapon accident.

C1.1.1. The procedures set out in this Manual comply with policy in reference (a) and DOE Orders 5530.1A, 5530.2, 5530.3, 5530.4, and 5530.5 (references (j) through (n)).

C1.1.2. Where appropriate, standardizing and coordinating DoD and DOE/NNSA procedures and methods for responding to a nuclear weapon accident under reference (d), reference (e) and, the Initial National Response Plan (reference (o)) shall be used.

C1.1.3. This Manual provides a framework for DoD forces and DOE/NNSA elements responding to nuclear weapon accidents where neither the Department of Defense nor the DOE/NNSA is the LFA under reference (e) or other interagency support agreements and emergency response plans.

C1.1.4. This Manual provides general guidelines for DoD forces and DOE/NNSA elements responding to a U.S. nuclear weapon accident on foreign territory.

C1.2. POLICY

C1.2.1. It is DoD policy that:

C1.2.1.1. In U.S. territory or territorial waters, the Department of Defense serves as the LFA in responding to an accident involving radioactive materials when the material is or was in DoD custody during the accident.

C1.2.1.2. An IRF shall be dispatched from the closest military installation having an appropriate emergency response capability during the radiological accident.

C1.2.1.3. A robust C2 element and staff, especially trained in nuclear weapon accident management, known as the RTF, shall be dispatched by a Combatant Commander to relieve the IRF.

C1.2.1.4. The Department of Defense shall provide resources, consistent with operational availability, to assist Federal, State, and local responses to radiological emergencies not resulting from radioactive material in DoD custody, as outlined in reference (d); reference (e); reference (o); DoD Directive 3025.1 (reference (p)); DoD Directive 3025.15 (reference (q)); Chairman of the Joint Chiefs of Staff CONPLAN 0-0500-98 (reference (r)).

C1.2.2. Under DOE/NNSA policy:

C1.2.2.1. In U.S. territory or territorial waters, the DOE/NNSA serves as the LFA in responding to an accident involving radioactive materials when the material is or was in DOE/NNSA custody during the accident.

C1.2.2.2. The DOE/NNSA provides resources, consistent with operational availability, to assist Federal, State, and local responses to radiological emergencies not resulting from radioactive material in DOE/NNSA custody, as outlined in references (d) and (e).

C1.3. ICS AND UNIFIED COMMAND OVERVIEW

C1.3.1. General. Responders at the Federal, State, and local level use the ICS to effectively handle emergencies in U.S. territory or territorial waters. The ICS is both a response philosophy and an operational response system employed by emergency responders nationwide. The Department of Defense and the DOE/NNSA adhere to the philosophy of the ICS and structure their response in a manner that eases this scheme. Although in many situations local-level Incident Commanders lead response activities, response to a nuclear weapon accident is unique. The Federal Government is authorized by section 2271 of reference (h) to protect against the unlawful dissemination of restricted data. Under the NIMS, the term "Incident Commander" refers to the individual in charge of an incident scene. For nuclear weapon accident response, the Incident Commander is the OSC, a term which shall be used in this Manual. Consequently, the Federal Government shall lead on-site activities when an NDA or NSA is created under the authority of reference (e). Even so, under their current policies, DoD and DOE/NNSA nuclear weapon accident response follows the basic tenets of Incident Command, to include:

C1.3.1.1. Unity of Command. There are clearly defined lines of authority and a hierarchy responsible for all deployed response assets.

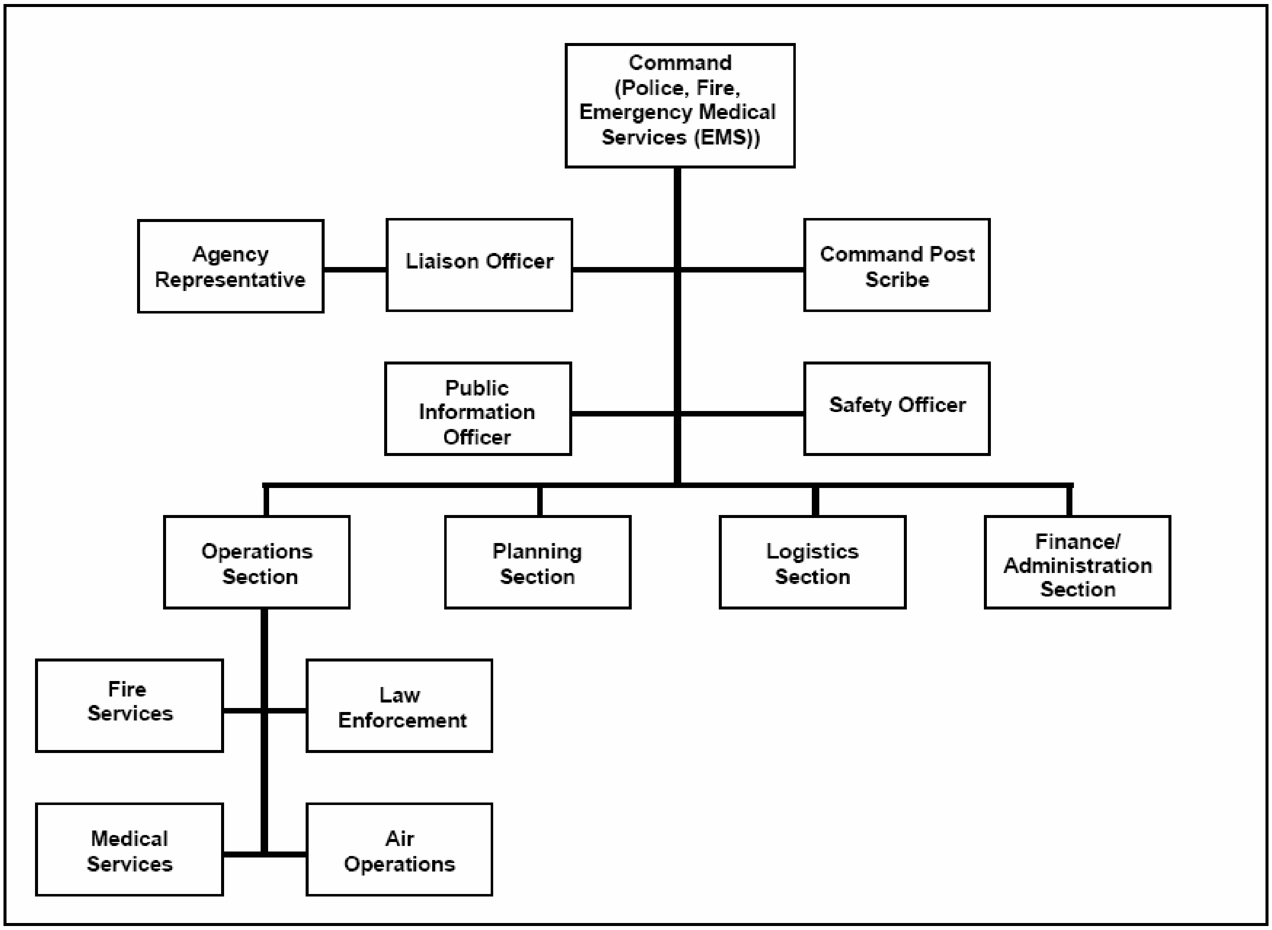
C1.3.1.2. Span of Control. The number of subordinates one supervisor may manage effectively. The optimum number of subordinates is five per supervisor.

C1.3.1.3. Functional Organization. Response elements are organized functionally and efforts are coordinated with elements of similar function.

C1.3.1.4. Resource Management. Deployed elements coordinate efforts to effectively use limited response resources. Also, the basic functions of ICS (e.g., operations, logistics, and support) may be tailored based on the specific requirements of the emergency response.

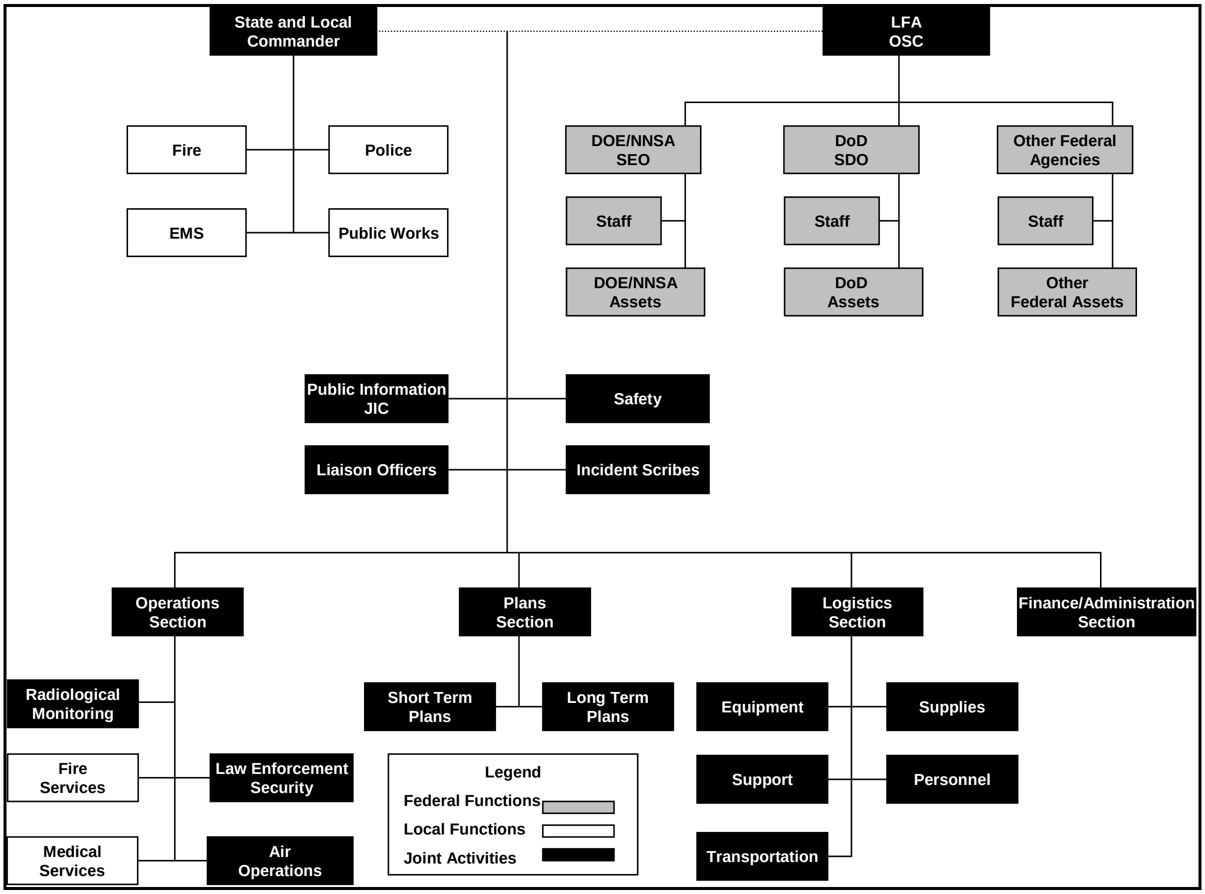
C1.3.2. ICS Structure. Under the ICS, a Unified Command is formed for events requiring a multi-jurisdictional response. A Unified Command allows agencies with responsibility (or jurisdictions) for an accident, either geographic or functional, to coordinate an emergency response without abdicating any of their authorities or responsibilities. A Unified Command allows responding elements to coordinate strategies, organizations, resources, and operations. The basic ICS structure to which many jurisdictions adhere is shown in figure C1.F1., below.

Figure C1.F1. Basic ICS Structure



C1.3.2.1. For a nuclear weapon accident, designated Federal senior-level management personnel, to include the OSC, the SDO, the SEO, respective supporting staffs, and operational responders, are modeled to support the basic configuration of the Unified Command. Figure C1.F2., below, shows the overall, generic operational structure as described by this concept.

Figure C1.F2. Unified Command and the Federal Response



C1.3.2.2. There is a broad degree of flexibility incorporated in this Unified Command concept to allow for various tailored responses given the specific nuances of the event. The response process is largely determined by the type of event; the size of consequences; its location (U.S. territory vs. foreign territory); logistical considerations; and consultation with Federal, State, and local officials responding to the event. Once determined, this process shall drive the specific design of the overall, organizational response structure and its protocols by which the Unified Command shall manage the response, lessening, and recovery of the emergency event.

C1.4. RESPONSIBILITIES WITHIN THE UNIFIED COMMAND

Federal senior officials, acting as the OSC, the SDO, and the SEO, shall interface with other Federal, State, and local officials in resolving the nuclear weapon accident.

C1.4.1. The DoD senior officials, acting as or in support of the LFA OSC, shall interface with other Federal, State, and local officials and provide security, communications, logistics,

medical, and public affairs support through deploying, coordinating, and managing specialized DoD assets. DoD support for DoD purposes is funded by the Department of Defense. DoD support for other Agencies is on a reimbursable basis. The DoD interface shall be positioned to do the following activities in support of the Unified Command structure:

C1.4.1.1. Implement and maintain an effective security program to control the accident area, protect classified material, and protect nuclear weapons and components. Security activities include:

C1.4.1.1.1. Establishing an NDA or NSA, as appropriate.

C1.4.1.1.2. Protecting nuclear weapons and components.

C1.4.1.1.3. Protecting classified materials and information.

C1.4.1.1.4. Protecting Government property.

C1.4.1.1.5. Providing unencumbered entry of medical and health physics personnel into the area when required.

C1.4.1.1.6. Providing necessary operational security.

C1.4.1.1.7. Effectively coordinating with civil law enforcement agencies and/or host nation law enforcement agencies.

C1.4.1.2. Provide logistical support including:

C1.4.1.2.1. Medical evacuation of acute casualties.

C1.4.1.2.2. Rapid transport from the airhead or the nearest military installation during early stages of the response.

C1.4.1.2.3. Airhead cargo support for air delivery of supplies to remote sites.

C1.4.1.2.4. Messing and billeting facilities for response force personnel.

C1.4.1.2.5. Sufficient supply of water to support response force personnel, equipment, and personnel Decontamination Stations.

C1.4.1.2.6. Sanitation facilities for response force personnel and news media.

C1.4.1.2.7. Heavy equipment for base camp construction and recovery and/or remediation operations.

C1.4.1.2.8. Packaging and shipping materials for weapons, components, and contaminated waste.

C1.4.1.2.9. Documenting accident-related costs.

C1.4.1.3. Provide communications support including:

C1.4.1.3.1. Establishing internal communications for the accident scene to include telephone communications between fixed site locations, field phones for EOD operations, local computer networks with internet access (if possible), and Ultra High Frequency (UHF)/Very High Frequency (VHF) nets.

C1.4.1.3.2. Establishing external communications between the accident scene and operations centers.

C1.4.1.3.3. Coordinating with other organizations to ensure that communications setups are interoperable.

C1.4.1.4. Provide radiological, radiation medicine, radiobiology, and site restoration advice and guidance to the OSC and medical staffs at the accident scene.

C1.4.2. Likewise, DOE policy provides that the DOE/NNSA, acting as or in support of the LFA OSC, shall deploy, coordinate, and manage their specialized assets related to weapon recovery, health and safety, and medical advice. Usually, the DOE/NNSA interface shall be positioned to do the following activities in support of the Unified Command structure:

C1.4.2.1. Provide public information advice and guidance to the LFA OSC and coordinate DOE/NNSA public information activities with Federal, State, and local officials through an LFA established JIC.

C1.4.2.2. Coordinate the offsite Federal radiological monitoring and assessment during the response to a nuclear weapon accident. Monitoring and assessment responsibilities include the following:

C1.4.2.2.1. Responding to an LFA or a State request for assistance by dispatching an RAP team or establishing an FRMAC, as dictated by the nature of the emergency.

C1.4.2.2.2. Supporting the monitoring and assessment programs of the State.

C1.4.2.2.3. Responding to the assessment needs of the LFA.

C1.4.2.2.4. Meeting statutory responsibilities of participating Federal Agencies.

C1.4.2.2.5. Coordinating offsite Federal monitoring and assessment activities with those of the State.

C1.4.2.2.6. Maintaining technical liaison with State and local agencies.

C1.4.2.2.7. Maintaining a common set of all offsite radiological monitoring data, in an accountable, secure, and retrievable form, and ensuring the technical integrity of the data.

C1.4.2.2.8. Providing monitoring data and interpretations, including exposure rate contours, dose projections, and any other requested radiological assessments, to the LFA and the State.

C1.4.2.2.9. Providing, in coordination with other Federal Agencies, the personnel and equipment needed to perform radiological monitoring and assessment activities.

C1.4.2.2.10. Transitioning monitoring and assessment responsibilities to the Environmental Protection Agency (EPA) at some mutually agreeable time, after the emergency phase.

C1.4.2.3. Advising on proper medical treatment of personnel exposed to, or contaminated by, radiological materials.

C1.4.2.4. Additional DOE/NNSA roles (not included in reference (e)) may include:

C1.4.2.4.1. Providing advice, assistance, and senior-level guidance on weapon recovery activities.

C1.4.2.4.2. Assessing the situation and providing specialized national radiological emergency response assets in coordination with the OSC, the DOE HQ, and Operations Office(s).

C1.4.2.4.3. Coordinating DOE/NNSA public information activities at the JIC or with State and local officials.

C1.4.2.4.4. Providing technical information and information on the status of the DOE/NNSA response.

C1.4.2.4.5. Keeping the LFA and other Federal Agencies informed of the status of DOE/NNSA technical response activities.

C1.4.2.4.6. Coordinating all State requests and offsite activities with the LFA and other Federal Agencies, as appropriate.

C1.4.2.4.7. Representing the DOE/NNSA for all departmental response operations, including prioritization, allocation of resources, insurance of cooperative functioning, and proper use and logistical support for DOE/NNSA emergency response assets at the accident site.

C1.4.2.4.8. Assessing the programmatic impacts and other contingencies from the field perspective.

C1.4.2.4.9. Ensuring preparation of periodic situation reports from the radiological

emergency asset team leaders and/or directors.

C1.4.2.4.10. Providing periodic situation reports to the DOE HQ and the OSC.

C1.4.2.4.11. Ensuring adequate logistics and operations support for DOE/NNSA field elements.

C1.4.2.4.12. Implementing guidance issued by the OSC and the DOE HQ.

C1.5. NUCLEAR WEAPON ACCIDENT RESPONSE PHASES

C1.5.1. There are five identifiable operational phases that constitute a response to a nuclear weapon accident: Notification and Deployment, Initial Response, Accident Site Consolidation, Weapon Recovery Operations and Disposition, and SR. Planning for and execution of response activities covering each phase shall overlap. Figure C1.F3., below, provides a notional timeline as to when each phase may occur during a response. Preparations and training for responses are not addressed in this Manual. Figure C1.F4., below, provides a notional illustration of specific response actions and the approximate time of their occurrence.

C1.5.1.1. Notification and Deployment. The notification and deployment phase begins once the accident has occurred and personnel having knowledge of the accident provide a voice report to the National Military Command Center (NMCC) or the DOE HQ Emergency Operations Center (HQ/EOC). Actions taken during this phase usually include notifying appropriate Federal, State, and local authorities; ensuring coordination and communication between the Department of Defense, the DOE/NNSA, and the two departments' sub-organizations; and executing logistics plans to deploy assets to the accident site. This phase draws down as increasing numbers of response forces arrive on-site.

C1.5.1.2. Initial Response. The initial response phase overlaps the notification and deployment phase, beginning when first responders arrive on-site. Actions taken during this phase usually include securing the area, lifesaving activities, firefighting activities, establishing C2, administering public and responder protection measures (shelter in place, evacuation, personal protective equipment (PPE)) and providing for necessary operational security. This phase draws down as the focus of the response shifts from immediate lifesaving, firefighting, and public protection activities to removing hazards and ensuring contamination control.

C1.5.1.3. Accident Site Consolidation. The accident site consolidation phase grows out of the initial response. This phase does not have a definite beginning point. It is marked by the arrival of a robust cadre of response assets and the stabilization of the accident site. Actions taken during this phase usually include establishing joint DoD and DOE/NNSA centers, offices, and groups to carry through the response; contamination control; continuing actions to reduce the health and safety risks of the public and response personnel; hazard removal; solidifying security measures; performing Initial RSPs; addressing public affairs issues; and initiating planning activities for SR.

C1.5.1.4. Weapon Recovery Operations and Disposition. The weapon recovery operations and disposition phase usually begins after imminent lifesaving and firefighting activities have been completed and short-term public and responder protection measures have been implemented. Actions taken during this phase include executing a systematic search for the weapon as well as monitoring, assessing, rendering safe, packaging, and removing nuclear weapon(s), components, and/or associated hazardous debris from the accident site. This phase ends after the weapon(s), components, and/or associated hazardous debris have been safely removed from the accident site.

C1.5.1.5. SR. The SR phase begins as SR planning activities commence during the accident site consolidation phase. SR efforts increase and progress as emergency actions resolve imminent danger. Actions taken during this phase include forming an SRWG, quantifying radiological hazards, establishing a sampling plan and control procedures, monitoring, assessing public risk, applying cleanup criteria, developing remediation plans and conducting studies, and administering the remediation plan. This phase may continue for years as the site is continually monitored and actions are taken to ultimately remediate the affected area to an agreed acceptable level.

Figure C1.F3. Notional Response Phase Timeline

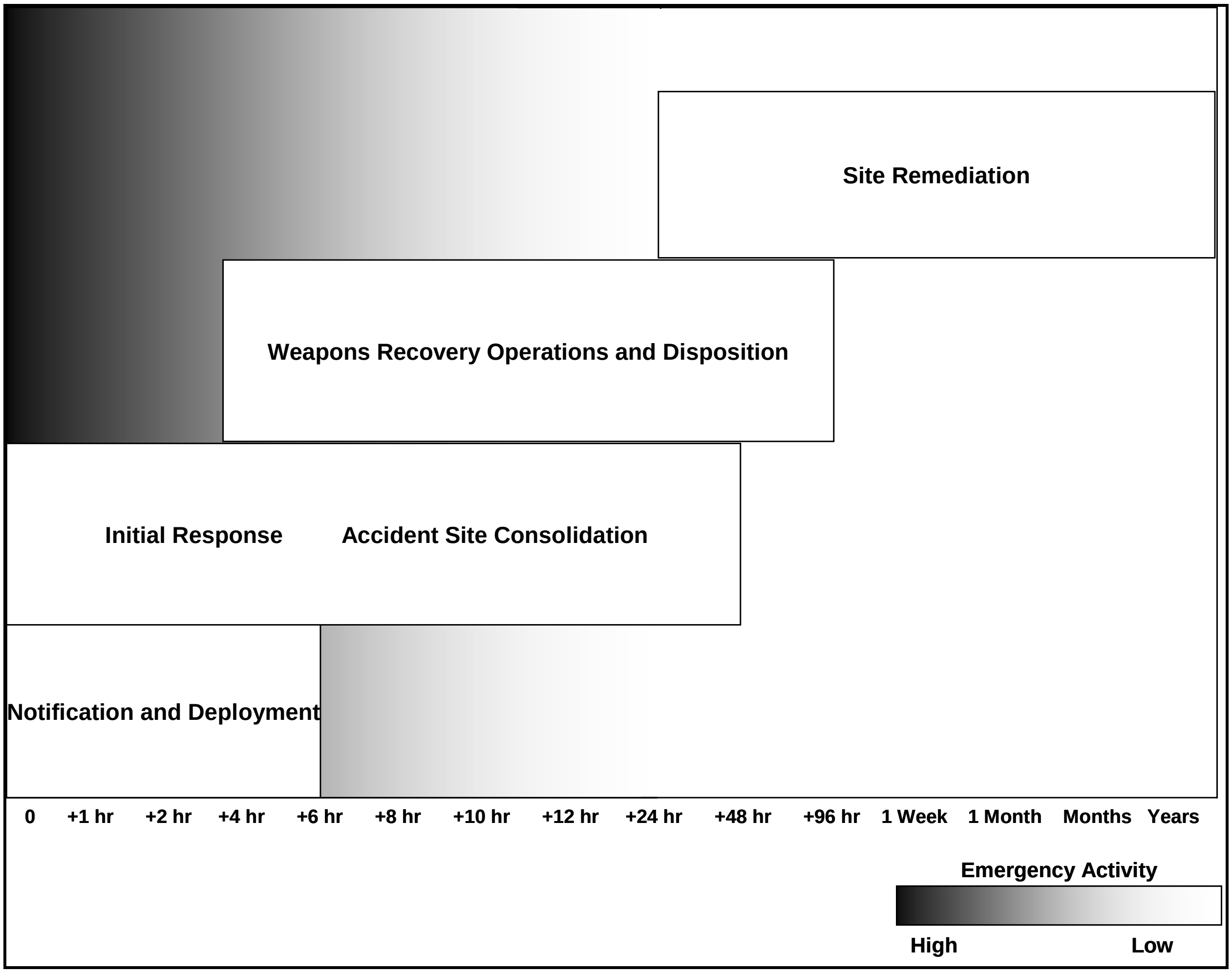


Figure C1.F4. Nuclear Weapon Accident Response Operations Flow Diagram

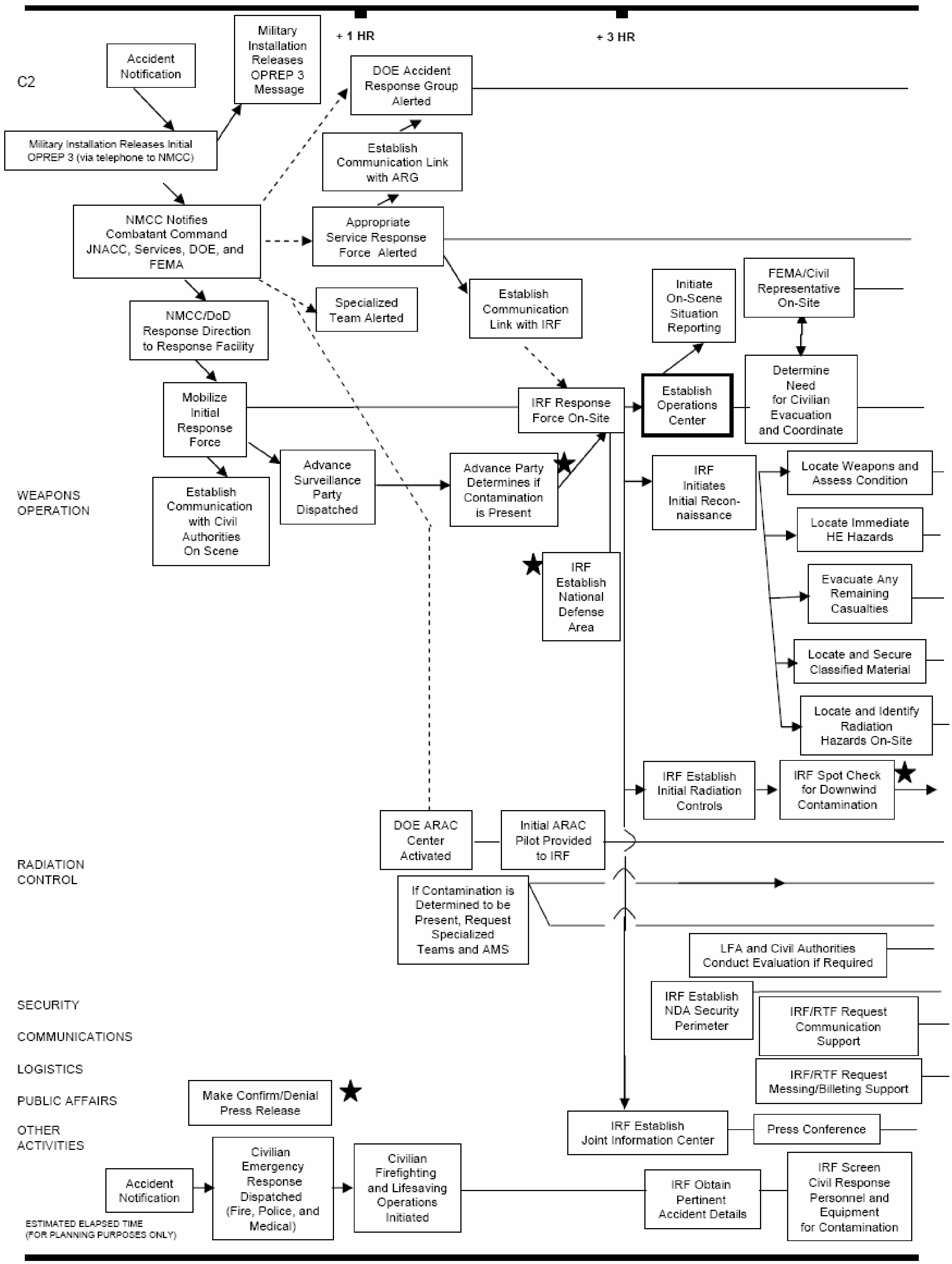


Figure C1.F4. Nuclear Weapon Accident Response Operations Flow Diagram, continued

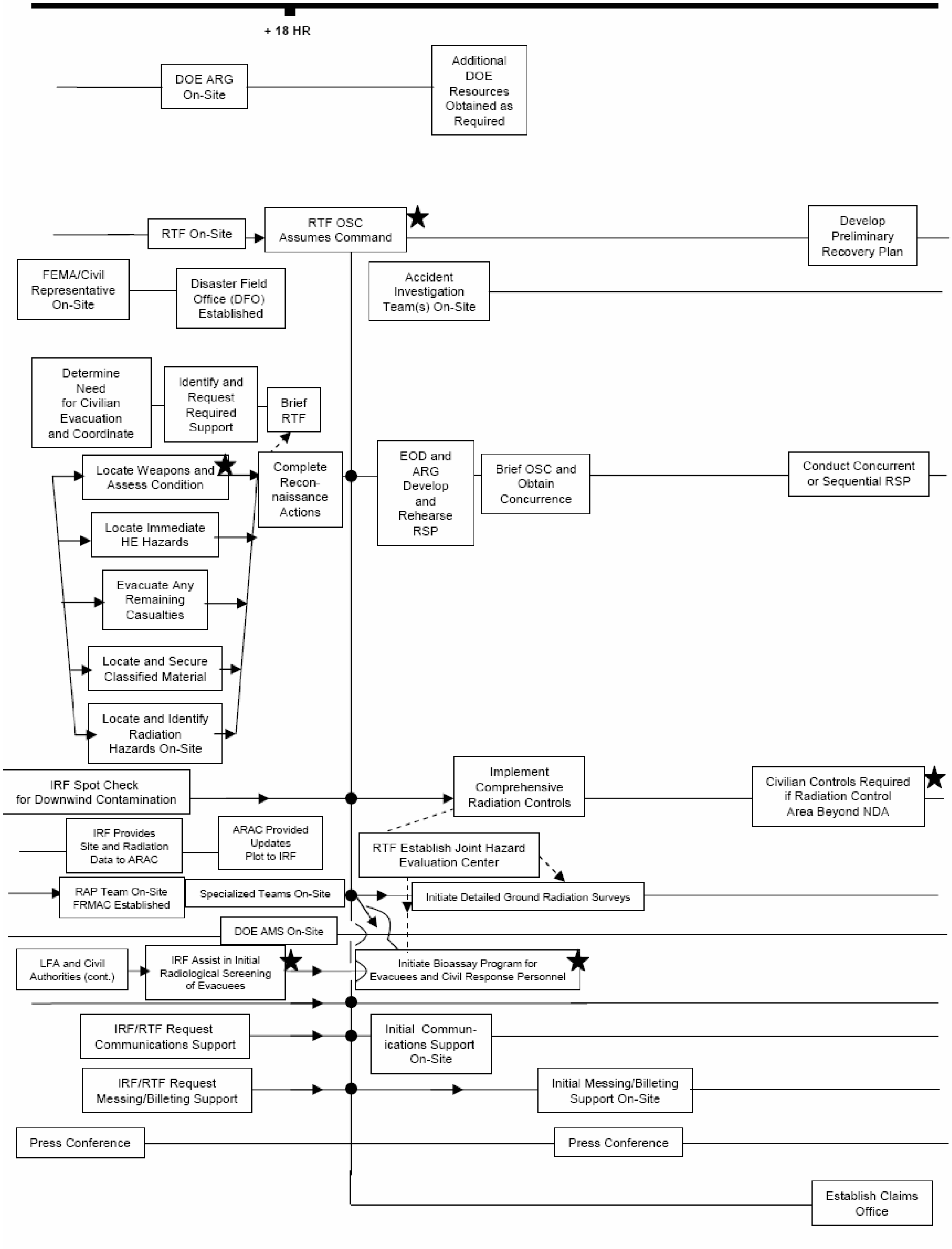
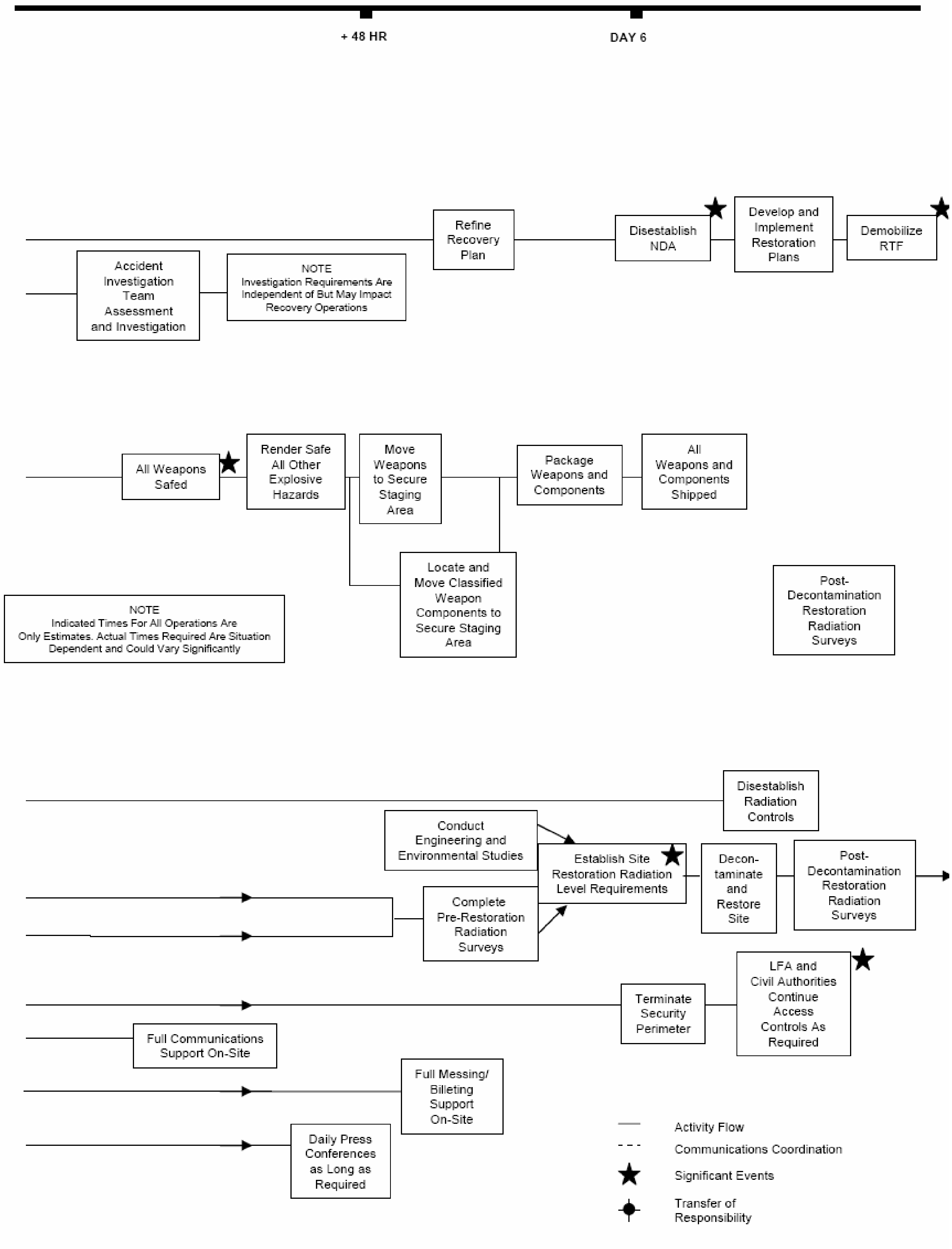


Figure C1.F4. Nuclear Weapon Accident Response Operations Flow Diagram, continued



C1.6. REPORTING REQUIREMENTS

C1.6.1. All radiological monitoring, measurement, and control forms described in this Manual are operating documents. Operating documents are exempt from licensing in accordance with paragraph C4.4.2. or DoD 8910.1-M (reference (r)).

C1.6.2. All routine, situation, accident data, and incident reports are exempt from licensing in accordance with paragraph C4.4.3. of reference (s)

C1.6.3. All information collected relative to Public Information Releases is exempt from licensing in accordance with paragraph C4.4.5. of reference (s).

C1.6.4. All investigative surveys are exempt from licensing in accordance with subparagraph C3.8.2.2.4. and paragraph C4.4.8. of reference (s).

C2. CHAPTER 2

FUNCTIONAL RESPONSE TIERS AND NUCLEAR WEAPON ACCIDENT RESPONSE ASSETS AND RESOURCES

C2.1. FUNCTIONAL RESPONSE TIERS

Response elements to a nuclear weapon accident are multi-tiered and may be separated into six distinct categories: Washington Principals, Departmental Crisis Action Teams (CATs), Intermediate HQ, On-Scene Command, Logistics, and Technical Operations. Each tier is critical to effecting a synthesized and coordinated national-level response. A brief description of each tier is provided below. Figure C2.F1., below, illustrates the assets and resources that comprise each tier.

C2.1.1. Washington Principals. Senior decision-makers at the highest levels of Government. Washington Principals include Cabinet-level officials, Departmental Under Secretaries and Assistant Secretaries, and Directorate Chiefs and above within the Office of the Joint Chiefs of Staff. These officials coordinate response actions throughout the interagency community and make decisions that ease a department's actions throughout the response.

C2.1.2. Departmental CATs. The command centers and specialized staffs that support department principals during the response. Examples of departmental CATs include the OSD Crisis Coordination Group (CCG), the Joint Staff's Joint Nuclear Accident/Incident Response Team (JNAIRT), the DTRA's Operations Center, and the DOE HQ/EOC. The CATs serve as the link and reachback terminal between the Washington Principals and personnel at the scene of the accident.

C2.1.3. Intermediate HQ. The Military Services, the Combatant Commands, and Federal Agency regional HQ. Intermediate HQ marshal assets to send to the accident scene to execute the Federal Government's response. Intermediate HQ also communicate directly with Departmental CATs throughout the response. Examples of intermediate HQ include the HQ of the Geographic Combatant Commanders and the DOE/NNSA Regional Operations Offices and their associated emergency operations centers (EOCs). For a nuclear weapon accident in U.S. territory, the U.S. Northern Command (NORTHCOM) (or the U.S. Pacific Command (PACOM) for Hawaii and U.S. territories in the Pacific) shall be the Combatant Commander with primary intermediate HQ responsibility. For a nuclear weapon accident outside U.S. territory, the Geographic Combatant Commander in whose Area of Responsibility (AOR) the accident occurs shall have primary intermediate HQ responsibility.

C2.1.4. On-Scene Command. The LFA's OSC, the SDO, the SEO, and supporting staff responsible for commanding the site resources to execute the Federal Government's response. As defined in reference (e), the OSC is the lead Federal official designated at the scene of the emergency to manage on-site activities and coordinate the overall Federal response to the emergency.

C2.1.5. Logistics. Those elements that move equipment, personnel, and other assets to deploy the response resources to the accident scene. Logistics support requirements may include: medical evacuation, rapid transport, airhead cargo support, transportation, messing and billeting facilities, water supply, maintenance support, sanitation facilities, equipment for base camp construction, packaging and shipping materials, electrical power, and laundry facilities.

C2.1.6. Technical Operations. Detailed technical procedures and personnel who conduct operations on-site at the accident scene. Such operations include weapons recovery RSP, radiation monitoring, etc.

Figure C2.F1. Functional Response Tiers and Associated Assets

<table>
<tr><td colspan="2">Washington Principals</td></tr>
<tr><td>Department of Defense
Secretary of Defense (SECDEF)
Deputy Secretary of Defense (DEPSECDEF)
Chairman, Joint Chiefs of Staff
Vice Chairman, Joint Chiefs of Staff
Directorate Chief, Joint Staff Directorate of Operations (J-3)
Under Secretary of Defense For Policy (USD(P))
Assistant Secretary of Defense (Special Operations/Low-Intensity Conflict) (ASD(SO/LIC))
Under Secretary of Defense For Acquisition, Technology, and Logistics (USD(AT&L))
ATSD(NCB)
Assistant Secretary of Defense For Public Affairs (ASD(PA))
Assistant Secretary of Defense For Health Affairs
Assistant Secretary of Defense For Legislative Affairs
DoD GC</td><td>DOE/NNSA
Secretary of Energy
Deputy Secretary of Energy
Administrator, NNSA
Defense Programs
Public Affairs
Security Affairs
Congressional and Intergovernmental Affairs
Environment, Health, and Safety
Nuclear Safety
Environmental Restoration and Waste Management
General Counsel (GC)</td></tr>
<tr><td colspan="2">Departmental CATs</td></tr>
<tr><td>Department of Defense
OSD Executive Support Center (ESC)
OSD CCG
NMCC
JNAIRT
DTRA Operations Center (DTRA/CSEO)/JNACC</td><td>DOE/NNSA
DOE HQ EOC
DOE HQ EMT
Albuquerque EOC
Las Vegas EOC</td></tr>
<tr><td colspan="2">Intermediate HQ</td></tr>
<tr><td>Department of Defense
Joint Forces Command (JFCOM): joint force provider to Geographic Combatant Commander
Pacific Command HQ
European Command (EUCOM) HQ
NORTHCOM HQ
AFBs
Naval Bases</td><td>DOE/NNSA
Brookhaven Group
Oak Ridge Operations Office
Savannah River Operations Office
Albuquerque Operations Office
Chicago Operations Office
Idaho Operations Office
Oakland Operations Office
Richland Operations Office</td></tr>
</table>

Figure C2.F1. Functional Response Tiers and Associated Assets, continued

Logistics	
Department of Defense	DOE/NNSA
U.S. Transportation Command Airlift Assets HARVEST FALCON/EAGLE Packages HAMMER Allied Command Europe (ACE) Packages Prime Base Engineer Emergency Forces (BEEF) Packages	RAP Vehicles AMS Flight Platforms
Technical Operations	
DoD	DOE/NNSA
RAMT AFRAT CMAT	AMS ARG RAP Radiation Emergency Assistance Training Center Consequence Management Planning Team (CMPT) Consequence Management Home Team (CMHT) Consequence Management Response Team (CMRT) I and II

C2.2. RESPONSE ASSETS AND RESOURCES

This section summarizes the response assets an OSC may call on to help respond to a nuclear weapon accident. This section is not a comprehensive guide of each asset's capabilities. Deployment timeframes are provided to assist in the planning process and to give the OSC and associated staffs an idea when assets shall arrive on-site. Note that these timeframes are notional because the time it shall take each asset to respond depends on the location of the accident. Points of contact are also provided so that the OSC and its staff may get additional information or call on the asset during a response.

C2.2.1. Military Command Centers. Table C2.T1., below, shows the Military Command Centers and their contact information.

Table C2.T1. Military Command Centers

NMCC	Defense Switched Network (DSN) 227-6340 Commercial (703) 697-6340
U.S. NORTHCOM Domestic Warning Center (DWC)	DWC Watch Chief DSN 692-2361 Commercial (719) 554-2361 DWC Land Desk, DSN 692-2359
JFCOM	DSN 262-6000 Commercial (757) 836-6000
EUCOM	DSN 315-430-3000 Commercial 049-711-680-3000
PACOM	DSN 315-477-5186 Commercial (808) 477-5186
U.S. Southern Command	DSN 567-4900 Commercial (305) 437-4900
Air Combat Command (ACC) RTF	DSN 574-1555 Commercial (757) 764-1555
U.S. Navy RTF East	DSN 573-4840 Commercial (912) 673-4840
U.S. Navy RTF West	DSN 322-5123 Commercial (360) 315-5123
USAF Space Command RTF	DSN 227-6103 Commercial (703) 697-6103 RTF Commander, Commercial (307) 773-5200
USAF Operations Center	DSN 227-6103 Commercial (703) 697-6103
U.S. Navy Operations Center	DSN 225-0231 Commercial (703) 695-0231
U.S. Army Operations Center	DSN 227-0218 Commercial (703) 697-0218
U.S. Marine Corps Operations Center	DSN 225-7399 Commercial (703) 695-7399
JDOMS	DSN 227-9400 Commercial (703) 697-9400

C2.2.2. Coordination Centers. Table C2.T2, below, shows the Coordination Centers and their contact information

Table C2.T2. Coordination Centers

OSD ESC	DSN 364-9320/22 Commercial (703) 769-9320/22
OSD Crisis Coordination Center	Commercial (703) 769-9337
Office of the ASD(PA)	DSN 227-5131 Commercial (757) 697-5131 Fax (703) 697-3501
JNACC	DSN 221-2102 Commercial (703) 325-2102
Department of Defense	DSN 221-2102/3/4 Commercial (703) 325-2102/3/4
DOE EOC	Commercial (202) 586-8100
Federal Bureau of Investigations (FBI) Operations Center	Commercial (202) 324-6700
Department of State (DOS) Operations Center	Commercial (202) 647-1512
FEMA Rapid Response Information System	Handled through DOE Operations Center Commercial (202) 586-8100
Nuclear Regulatory Commission (NRC) Operations Center	Commercial (301) 816-5100
U.S. Coast Guard National Response Center	Commercial (800) 424-8802

C2.2.3. DoD Assets and Resources

C2.2.3.1. Advisory, Coordination, and CM

C2.2.3.1.1. Joint Staff JNAIRT

C2.2.3.1.1.1. The Joint Staff JNAIRT may be contacted at:
J3 Deputy Director for Global Operations/Strategic Operations Division.
NMCC, Pentagon, Washington, D.C. 20318-3000.
For more information call
(703) 695-3436, DSN: 225-3436; or (703) 697-3659, DSN 227-3659

C2.2.3.1.1.2. Figure C2.F2., below, shows the mission, deployment timeframe, and capabilities of the JNAIRT.

Figure C2.F2. Mission, Deployment Timeframe, and Capabilities of the JNAIRT

JNAIRT Mission
The JNAIRT assists the NMCC general and/or flag officer and may deploy forces in response to a nuclear accident. The JNAIRT shall coordinate and monitor the early operational response for the Chairman of the Joint Chiefs of Staff in his or her exercise of control of military response operations until the situation stabilizes and control is transferred to the appropriate Combatant Commander.
Deployment Timeframe

Figure C2.F2. Mission, Deployment Timeframe, and Capabilities of the JNAIRT, continued

N/A
Capabilities
During an emergency, the JNAIRT may provide: • personnel representing all the staff elements and areas of expertise likely to have a role in the Department of Defense's response to the accident.

C2.2.3.1.2. OSD CCG

C2.2.3.1.2.1. The OSD CCG may be contacted at:
Office of the Deputy Assistant to the Secretary of Defense for Nuclear Matters
3C125, Pentagon, Washington, D.C. 20301-3050.
For more information call
(703) 693-9409, DSN: 223-9409

C2.2.3.1.2.2. Figure C2.F3., below, shows the mission, deployment timeframe, and capabilities of the OSD CCG.

Figure C2.F3. Mission, Deployment Timeframe, and Capabilities of the OSD CCG

OSD CCG Mission
The OSD CCG supports the ATSD(NCB) in his or her role as technical advisor to the Secretary of Defense and OSD Principal Staff Assistants on radiological accidents, weapons composition, characteristics, and safety features; interdepartmental responsibilities and the Federal radiological emergency response system; and technical capabilities of the various Federal response elements. The OSD CCG shall convene for the OSD principals to exchange information and coordinate on policy matters that may arise as details become known and FRPs are put into effect. The OSD CCG is not in the chain of command and shall rely on the JNAIRT for current information. Its focus shall be on policy matters, public affairs, DoD liabilities, and budget issues. It shall have an Action Officer-level CAT, with Liaison Officers (LNOs) from the DTRA, the AFRRI, and the DOE, which shall handle the day-to-day monitoring of the situation and provide recommendations to the CCG.
Deployment Timeframe
N/A
Capabilities
During an emergency, the CCG may provide: • Personnel representing all the staff elements and areas of expertise likely to have a role in the Department of Defense's response to the accident.

C2.2.3.1.3. DTRA JNACC

C2.2.3.1.3.1. JNACC offices are located in Albuquerque, NM (505) 845-4667, and in Alexandria, VA (703) 325-2102, DSN 221-2102.

C2.2.3.1.3.2. Figure C2.F4., below, shows the mission, deployment timeframe, and capabilities of the DTRA's JNACC.

Figure C2.F4. Mission, Deployment Timeframe, and Capabilities of the JNACC

JNACC Mission
The JNACC is a combined DTRA and DOE-centralized Agency for exchanging and maintaining information about radiological assistance capabilities and coordinating that assistance in response to an accident or incident involving radioactive materials.
Deployment Timeframe
N/A
Capabilities
During an emergency, the JNACC may provide: • Coordination of accident or incident information and request for assistance • Accident or incident information to the appropriate Commands and Agencies • Current information about the location and availability of specialized DoD and DOE teams or organizations capable of responding to accidents or significant incidents involving radioactive material

C2.2.3.1.4. DTRA CMAT and Subset MRAT

C2.2.3.1.4.1. CMAT. DSN 221-2102/3/4, Commercial (703) 325-2102/3/4

C2.2.3.1.4.2. MRAT. DSN 295-0530, Commercial (301) 295-0530

C2.2.3.1.4.3. Figure C2.F5., below, shows the mission, deployment timeframe, and capabilities of the CMAT.

Figure C2.F5. Mission, Deployment Timeframe, and Capabilities of the CMAT

CMAT Mission
The CMAT is trained and equipped to help the OSC assess and predict contamination, after a nuclear accident. A CMAT advance party may deploy to assess the on-site situation and may be followed by additional personnel based on the situation. The CMAT advises the OSC on overall Federal response procedures and requirements associated with a nuclear weapon accident response. A special team of medical effects experts and health physicists from the AFRRI also deploys as part of the CMAT. This is known as the MRAT.
Deployment Timeframe
The CMAT has a 1-hour notification time; deployment time depends on aircraft availability.
Capabilities
During an emergency, the CMAT may provide: • Hazard prediction and modeling capability • Secure and non-secure satellite voice, data, and fax communications • Public affairs personnel • Legal counselors • An extensive technical publications library on nuclear weapons and materials • Guidance and advice on current techniques for radiation injury treatment and internal decontamination • Casualty estimates (Biodosimetry Assessment Tool (BAT)) • Guidance and advice about the potential health hazards and performance decrement effects from exposure to various doses of ionizing radiation • Advice on appropriate bioassay and clinical procedures • MRAT physicians who have access to and expertise in the use of pharmaceutical agents for treating radiation injury, including internal contamination.

C2.2.3.1.5. U.S. NORTHCOM Joint Task Force Civil Support (JTF-CS)

C2.2.3.1.5.1. The JTF-CS is headquartered at Fort Monroe, Virginia, and may be contacted at DSN 680-6840/6348, Commercial (757) 788-6840/6348, or on the web at jtfcscdo@jtfcs.northcom.mil or jtfcscdo@jtfcs.northcom.smil.mil.

C2.2.3.1.5.2. Figure C2.F6., below, shows the mission, deployment timeframe, and capabilities of the JTF-CS.

Figure C2.F6. Mission, Deployment Timeframe, and Capabilities of the JTF-CS

JTF-CS Mission
The JTF-CS plans and integrates DoD support to the designated LFA for domestic chemical, biological, radiological, nuclear, or high-yield explosive (CBRNE) CM operations. When directed by the Commander, U.S. NORTHCOM, the JTF-CS shall deploy to the incident site, establish C2 of designated DoD forces, and provide military assistance to civil authorities to save lives, prevent injury, and provide temporary critical life support.
Deployment Timeframe
JTF-CS personnel have a 2-hour recall time; a 4-hour requirement to deploy Command Assessment Element, when notified; and a 10-hour requirement to deploy HQ, when directed. Sourced DoD units on the CBRNE CM Initial Entry Force have a standing prepare to deploy order.
Capabilities
The JTF-CS serves as the operational HQ for the U.S. NORTHCOM to conduct domestic CBRNE CM operations in support of an LFA. This mission includes, but is not limited to, the following range of activities: • Conducting contingency planning with Federal Departments and Agencies. • Conducting operational liaison activities with local, State, and Federal Departments and Agencies. • Conducting CBRNE CM exercises within the Department of Defense and with other local, State, and Federal Departments and Agencies. • Conducting CBRNE CM training and exercises with DoD forces identified to conduct CBRNE CM operations. • Conducting situational assessments following CBRNE events for the Commander in close coordination with State and Federal authorities. • Organizing, deploying, establishing C2, and redeploying DoD assigned, attached, or operationally or tactically controlled forces. • Conducting deliberate planning in support of designated National Special Security Events. • Organizing and providing CBRNE CM planning supplementation and technical support, as directed.

C2.2.3.2. Logistics

C2.2.3.2.1. The USAF HARVEST FALCON/EAGLE Packages are headquartered at Holloman, AFB, New Mexico, 49th Materiel Maintenance Group (ACC assets).

C2.2.3.2.1.1. Logistical Support. DSN 572-5015, Commercial (505) 572-5015.

C2.2.3.2.1.2. Supply Customer Service. DSN 572-3347, Commercial (505) 572-3347.

C2.2.3.2.1.3. Figure C2.F7., below shows the mission, deployment timeframe, and capabilities of the HARVEST FALCON/EAGLE Packages.

Figure C2.F7. Mission, Deployment Timeframe, and Capabilities of the USAF HARVEST FALCON/EAGLE Packages

HARVEST FALCON/EAGLE Mission
The Harvest Falcon system is a transportable system used to accommodate USAF personnel and required operational facilities when deployed to remote locations.
Deployment Timeframe
Deployment timeframe is based on the availability of assets and airlift (see Appendix 21 for details).
Capabilities
During an emergency, HARVEST FALCON/EAGLE may provide: • living accommodations • aircraft flight line facilities • administrative support functions • medical NBC Team (FFGL1) providing additional workforce and equipment for radiological events

C2.2.3.2.2. USAF Expeditionary Medical Support (EMEDS)

C2.2.3.2.2.1. The USAF EMEDS Capabilities may be reached through the USAF Operations Group, DSN 227-6103 or Commercial (703) 697-6103.

C2.2.3.2.2.2. Figure C2.F8., below shows the mission, deployment timeframe, and capabilities of the USAF EMEDS.

Figure C2.F8. Mission, Deployment Timeframe, and Capabilities of the USAF EMEDS

EMEDS Mission
Provide scalable rapid medical care (initial or follow-on) capability as part of an installation-to-installation or civil support operation response as part of a CBRNE attack or accident. Shall deliver modular medical assets to support U.S. NORTHCOM missions.
Deployment Timeframe
Response begins 3-5 hours post event, moves within 12 hours, and is operational within 24 hours. Sustainment is 7 days post event (the expected time required to federalize active duty military medical support).
Capabilities
The USAF EMEDS may be "tailored" to provide: • Force health protection to population at risk up to 5,000 for 7 days • Public health and preventive medicine, and flight medicine • Primary care, emergency medicine, emergency surgery, and preoperative care • Critical care stabilization and mental health crisis intervention • 25-bed Expeditionary Hospital plus 25, surgically supplemented to provide 20 surgical and/or 20 non-operative surgical resuscitations in 72 hours plus three critical care beds • "One Trailer Hospital" (Small Portable Expeditionary Aeromedical Rapid Response Team) Capability: 10 surgeries or 10 non-operative resuscitations in 36 hours plus one critical care bed • Critical Incident Stress Management Team Critical Care Air Transport Team (CCATT): 3 ventilators

Figure C2.F8. Mission, Deployment Timeframe, and Capabilities of the USAF EMEDS, continued

• Surveillance team: lab team with ruggedized advanced pathogen identification device, for biologicals • 10-bed Mobile Aeromedical Evacuation (AE) Staging Facility: holding beds for AE • AE patient movement items to resupply CCATTs • Medical NBC Team (FFGL1) providing additional workforce and equipment for radiological events

C2.2.3.3. Engineer

C2.2.3.3.1. USAF Prime BEEF Packages

C2.2.3.3.1.1. For the USAF Prime BEEF Packages, contact the USAF Operations Center, DSN 227-6103 or Commercial (703) 697-6103.

C2.2.3.3.1.2. Figure C2.F9., below, shows the mission, deployment timeframe, and capabilities of the USAF Prime BEEF Packages.

Figure C2.F9. Mission, Deployment Timeframe, and Capabilities of the USAF Prime BEEF Packages

Prime BEEF Package Mission
The Prime BEEF teams are mobile assets deployed to perform a wide variety of engineering tasks. Typically, the Prime BEEF teams deploy with three Unit Type Codes (UTC) totaling 105 personnel, which may be tailored to fit the specific mission requirements.
Deployment Timeframe
The Prime BEEF units may deploy within the following timeframes: 24 hours for active units, 28 hours after activation for Air National Guard units, and 52 hours after activation for Air Force Reserve Command units.
Capabilities
During an emergency, the Prime BEEF packages may: • When combined with other capabilities, become a fixed Main Operating Base combat support force capable of accomplishing force bed down, attack response and damage-related repair, along with day-to-day air base facility operations and maintenance.

C2.2.3.3.2. USAF Fire Protection Package

C2.2.3.3.2.1. For the USAF Fire Protection Package, contact the USAF Operations Center, DSN 227-6103 or Commercial (703) 697-6103.

C2.2.3.3.2.2. Figure C2.F10., below shows the mission, deployment timeframe, and capabilities of the USAF Fire Protection Package.

Figure C2.F10. Mission, Deployment Timeframe, and Capabilities of the USAF Fire Protection Package

Fire Protection Package Mission
The fire protection packages are mobile workforce and equipment assets that may deploy for contingency and wartime operations worldwide, where they combine to form a fire and emergency services response force.
Deployment Timeframe

Figure C2.F10. Mission, Deployment Timeframe, and Capabilities of the USAF Fire Protection Package, continued

Fire Protection packages may deploy within the following timeframes: 24 hours for active units, 28 hours after activation for Air National Guard units, and 52 hours after activation for Air Force Reserve Command units.
Capabilities
During an emergency, the fire Protection packages provide: • Incident C2 • Structural and/or aircraft fire suppression and rescue • Limited defensive, operations-level HAZMAT response • First responder level EMS

C2.2.3.3.3. USAF Civil Engineer Readiness Package

C2.2.3.3.3.1. For the USAF Civil Engineer Readiness Package, contact: USAF Operations Center, DSN 227-6103 or Commercial: (703) 697-6103.

C2.2.3.3.3.2. Figure C2.F11., below shows the mission, deployment timeframe, and capabilities of the USAF Civil Engineer Readiness Package.

Figure C2.F11. Mission, Deployment Timeframe, and Capabilities of the USAF Civil Engineer Readiness Package

Civil Engineer Readiness Package Mission
The Civil Engineer Readiness packages provide limited NBC, and conventional defense supporting activities ranging from smaller-scale contingency operations to major theater war and response to major accidents and natural disasters.
Deployment Timeframe
The Civil Engineer Readiness packages may deploy within the following timeframes: 24 hours for active units, 28 hours after activation for Air National Guard units, and 52 hours after activation for Air Force Reserve Command units.
Capabilities
During an emergency, the Civil Engineer Readiness packages may provide: • Preliminary risk and/or vulnerability assessments and threat analysis • Planning • Detection and identification of NBC hazards • NBC warning and reporting • Decontamination and contamination control area (CCA) operations • Disaster response equipment • Technical data

C2.2.3.3.4. USAF RED HORSE Squadrons

C2.2.3.3.4.1. For the USAF RED HORSE, contact ACC Civil Engineer HQ DSN 574-2001 or Commercial (757) 764-2001.

C2.2.3.3.4.2. Figure C2.F12., below, shows the mission, deployment timeframe, and capabilities of the USAF RED HORSE Squadrons.

Figure C2.F12. Mission, Deployment Timeframe, and Capabilities of the USAF Red Horse Squadrons

RED HORSE Mission
The RED HORSE squadrons provide the Air Force with a highly mobile civil engineering response force to support contingency and special operations worldwide. They are self sufficient, 404-person mobile squadrons capable of rapid response and independent operations in remote, high-threat environments worldwide. They provide heavy repair capability and construction support when requirements exceed normal base civil engineer capabilities and where Army engineer support is not readily available. They have weapons, vehicles, and/or equipment and vehicle maintenance, food service, supply, and medical equipment.
Deployment Timeframe
The RED HORSE squadrons may deploy within 16-96 hours, depending on the force structure size.
Capabilities
During an emergency, the RED HORSE Squadrons may provide: • Highly mobile, rapidly deployable, civil engineering response force that is self-sufficient to perform heavy damage repair required for recovery of critical Air Force facilities and utility systems, and aircraft launch and recovery • Engineering support for beddown of weapon systems required to initiate and sustain operations in an austere bare base environment, including remote hostile locations

C2.2.3.4. EOD. U.S. Military EOD:

C2.2.3.4.1. For the U.S. Army Guardian Brigade (which shall subsume the responsibilities of the 52nd U.S. Army EOD) contact the U.S. Army Operations Center, DSN 227-0218 or Commercial (703) 697-0218.

C2.2.3.4.2. The U.S. Navy EOD Mobile Unit 6, Detachment, located at Kings Bay, GA, may be contacted at (912) 573-2078, DSN: 573-2078, or Duty Cell: (912) 856-4119 (24-hour emergency contact number).

C2.2.3.4.3. The U.S. Navy EOD Mobile 11, Detachment, located at Bangor, WA, may be contacted at (360) 396-4576, DSN: 744-4576, or Duty Cell: (360) 981-2339 (24-hour emergency contact number).

C2.2.3.4.4. The USAF EOD HQ, USAF Civil Engineer Support Agency/Contingency Support Directorate, Explosive Ordnance Disposal, located at Tyndall AFB, FL, may be contacted at (850) 283-6410, (850) 283-6229 (24-hour emergency number), or DSN 523-6410; or contact the USAF Operations Center at Commercial: (703) 697-6103 or DSN 227-6103.

C2.2.3.4.5. Figure C2.F13., below, shows the mission, deployment timeframe, and capabilities of the U.S. Military EOD teams.

Figure C2.F13. Mission, Deployment Timeframe, and Capabilities of the U.S. Military EOD Teams

EOD Mission
All four Military Services have EOD assets. All these assets have the capability to fulfill the initial response requirements of weapons verification, damage assessment, and electrical RSPs. In accordance with AR 75-14/OPNAVINST 8027.1G/MCO 8027.1D/AFJI 32-3002 (reference (t)) the Service that first becomes aware of an incident involving Explosive Ordnance of another Service or Federal Agency shall act to prevent or limit damage or injury. Incidents occurring in another Service's operational area shall be reported in accordance with the responsible Service's operational procedures. Usually, in emergencies, the closest EOD unit should respond immediately with the understanding that the responsible Service keeps operational control. To ensure response by the most qualified and knowledgeable personnel, the application of further RSPs and disposal procedures on Service-unique nuclear weapon systems shall be performed by EOD personnel of that Service. RTF EOD support shall come from the Service associated with the weapon(s) involved in the accident. Initial EOD support in Outside the Continental United States (OCONUS) areas shall come from the nearest EOD unit, with follow on support again coming from the Service to which the weapon is associated. IRF EOD personnel may become part of the RTF.
Deployment Timeframe
30 minutes during normal duty hours. 1 hour after normal duty hours, weekends, and holidays
Capabilities
During an emergency, EOD may: • Provide technical expertise on EOD • Provide expertise on explosives and device components in general • Identify and render safe U.S. and foreign military munitions (conventional, chemical, and nuclear) • Respond to and render safe terrorist IEDs, i.e., pipe bombs, booby traps

C2.2.3.5. Communications. The USAF HAMMER ACE Package.

C2.2.3.5.1. Based at Scott AFB, IL, Command Post.

C2.2.3.5.2. Contact the USAF Operations Center, DSN 227-6103 or Commercial (703) 697-6103; Scott AFB, DSN 576-5891, Commercial (618) 256-5891, DSN 576-3431, Commercial (618) 256-3431; or email: AFCA-SYH@scott.af.mil.

C2.2.3.5.3. Figure C2.F14., below shows the mission, deployment timeframe, and capabilities of the USAF HAMMER ACE Package.

Figure C2.F14. Mission, Deployment Timeframe, and Capabilities of the USAF HAMMER ACE Package

HAMMER ACE Mission
HAMMER ACE is a quick reaction communications response capability for worldwide support of nuclear and aircraft mishaps, natural disaster relief operations, and other Air Force emergency operations.
Deployment Timeframe
HAMMER ACE may deploy within 3 hours and establish communication within 30 minutes of arrival on-site.
Capabilities
During an emergency, HAMMER ACE may provide: • Extremely High Frequency Single Channel Anti-Jam Man-Portable Terminal • forward deployment into cordon area long haul communications (International Marine Satellite

Figure C2.14. Mission, Deployment Timeframe, and Capabilities of the USAF HAMMER ACE Package, continued

• (INMARSAT))
• Still and motion imagery
• Imagery and data transfer
• Internet capability with reach back to the DTRA

C2.2.3.6. Radiological

C2.2.3.6.1. U.S. Army RAMT

C2.2.3.6.1.1. Additional information may be obtained from the Commander, North Atlantic Regional Medical Command (NARMC), Building 41 Room 38, 6825 16th Street NW, Washington, D.C., 20307-5001 (phone (202) 356-0058 or fax (202) 356-0086).

C2.2.3.6.1.2. RAMT services should be requested through the Army Operations Center (DSN 227-0218 or Commercial (703) 697-0218).

C2.2.3.6.1.3. Figure C2.F15, below, shows the mission, deployment timeframe, and capabilities of the U.S. Army RAMT.

Figure C2.F15. Mission, Deployment Timeframe, and Capabilities of the U.S. Army RAMT

RAMT Mission
The U.S. Army RAMT assists and supplies radiological health hazard guidance to the OSC or other responsible officials at an accident site, and the Installation Medical Authority. The Commanding General (CG), NARMC, establishes the RAMT with primary responsibility in the CONUS. The CG, 7th Medical Command, establishes the RAMT with primary responsibility throughout Europe. The RAMT may be deployed to other areas of the world, as required, or to assist the other teams on request. For worldwide RAMT deployments, additional information may be obtained from the CG, NARMC, Walter Reed Army Medical Center (WRAMC) Health Physics Office, 6900 Georgia Avenue, NW, Washington D.C. 20307-5001, phone (202) 356-0058/0060/0063, fax (202) 356-0086. For European RAMT deployments, additional information may be obtained from the Commander, U.S. Army Europe Center for Health Promotion and Preventive Medicine – Europe, Landstuhl, Germany, phone 011-49-6371-86-8551/8369. RAMT activation may occur through the NMCC at (703) 697-6340/3436, the JNACC at (703) 325-2102, or the Army Operations Center at (703) 697-0218. During duty hours contact the NARMC/WRAMC health Physics Office at (202) 356-0058/0060/0063 or DSN 642-0058. The NARMC RAMT Officer pager is on the SkyTel System; call 1-800-759-8888 and enter Personal Identification Number (PIN) 1575809. The NARMC RAMT SkyTel PIN is 1575812.
Deployment Timeframe
The RAMT may deploy within 4 hours after notification and shall arrive anywhere in the world within 24 hours.
Capabilities
During an emergency, the RAMT may provide: • Guidance relative to the potential health hazards to personnel from radiological contamination, or exposure to ionizing radiation • Evaluation of survey data to provide technical guidance to the responsible officials using radiologically contaminated areas • Monitoring of medical facilities and equipment where contaminated patients have been evacuated

Figure C2.F15. Mission, Deployment Timeframe, and Capabilities of the U.S. Army RAMT, continued

• Advice to the OSC on the potential health hazards from exposure to sources of ionizing radiation and the decontamination of personnel, medical treatment facilities, and medical equipment • Advice on early, and follow-up, laboratory, and clinical procedures • Assistance to the OSC with the bioassay program

C2.2.3.6.2. AFRAT

C2.2.3.6.2.1. Based at the Air Force Institute for Environment, Safety, and Occupational Health Risk Analysis, 311 Human System Wing, Brooks AFB, San Antonio, TX.

C2.2.3.6.2.2. During Central Time Zone duty hours: DSN 240-3486 or Commercial (210) 536-3486.

C2.2.3.6.2.3. After duty hours, Brooks AFB Command Post: DSN 240-3278, Commercial (210) 536-3278, or Pager (210) 553-0848.

C2.2.3.6.2.4. Figure C2.F16, below, shows the mission, deployment timeframe, and capabilities of the AFRAT.

Figure C2.F16. Mission, Deployment Timeframe, and Capabilities of the AFRAT

AFRAT Mission
The AFRAT is ready in the event of a nuclear weapon accident or incident involving the potential release of radionuclides. It may provide a full range of equipment, force protection dosimetry, and consultation about health physics, industrial hygiene, and environmental quality to the OSC. The capability is comprised of five UTC teams: Nuclear Incident Response Force I, Nuclear Incident Response Force II, Radiological Reconnaissance Laboratory I, Radiological Reconnaissance Laboratory II, and Field Laboratory for Assessment of Radiation Exposure.
Deployment Timeframe
The AFRAT may deploy to any location, worldwide, within 48 hours.
Capabilities
During an emergency, the UTC teams may provide: • On-site detection, identification, and quantification of ionizing radiation hazards • External dosimetry support for force protection of up to 1000 reads a day • 28 extra-duty personnel, that include occupational health physicians, health physicists, bioenvironmental engineers, bioenvironmental engineering technicians, radioanalytical laboratory technicians, radiochemists, and laboratory technicians with expertise in industrial hygiene and environmental quality

C2.2.3.6.3. U.S. Navy Forward Deployable Preventive Medicine Unit (FDPMU)

C2.2.3.6.3.1. May be contacted through the Officer in Charge, Navy Environmental and Preventive Medicine Unit No. 2, Norfolk, VA, and Unit No. 5, San Diego, CA.

C2.2.3.6.3.2. Norfolk Unit. DSN 377-7671 or Commercial (757) 444-7671.

C2.2.3.6.3.3. San Diego Unit. DSN 526-7070 or Commercial (619) 556-7070.

C2.2.3.6.3.4. Additional information may be obtained from the Commanding Officer (CO), Navy Environmental Health Center, 620 John Paul Jones Circle, Suite 1100, Portsmouth, VA 23708-2103 (phone (757) 953-0700 or fax (757) 953-0680).

C2.2.3.6.3.5. Figure C2.F17., below, shows the mission, deployment timeframe, and capabilities of the U.S. Navy FDPMU.

Figure C2.F17. Mission, Deployment Timeframe, and Capabilities of the U.S. Navy FDPMU

FDPMU Mission
Enhance forward deployable capability for health surveillance and force health protection including: Operational threat assessment and risk communication, surveillance, detection, and identification of chemical, biological, radiological, or environmental agents and other stressors, and recommend appropriate countermeasures to these threats. Additionally, conduct heath assessments of potential exposure to chemical, biological, radiological, or environmental agents and other stressors, and recommend appropriate countermeasures to identified threats. Provide rapid technical assistance in support of CM operations involving Weapons of Mass Destruction (WMDs).
Deployment Timeframe
Within 48 hours.
Capabilities
On-site detection and surveys for alpha, beta, gamma, and X-ray radiation. Identification of gamma-emitting isotopes with spectrum analysis. Radiation monitoring and air sampling on-site, and contamination sampling with reach back analysis. Health physicist on-site (risk management, dose estimation, personnel training, etc.).

C2.2.3.6.4. Radiological Asset Core Competencies. Table C2.T3., below, shows the radiological asset core competencies for the Department of Defense's specialized radiological response teams.

Table C2.T3. Radiological Asset Core Competencies

	AFRRI MRAT	Air Force AFRAT	ARMY RAMT	Navy FDPMU Online Fiscal Year 04
Responder Radiological Training	X	X	X	X
Radiation Risk Communication	X	X	X	X
Personnel Dose Estimation	X	X	X	X
Radiation Medicine Physician	X		X	
Chelation Therapy	X		X	
Emetics and/or Cathartics	X		X	
Protectants	X		X	
Therapeutics	X		X	
Psychological Awareness	X		X	
Hand Held Nuclide Identification	X	X	X	X
Field Surveys - Quantitative		X		X
Laboratory Nuclide Analysis				

Table C2.T3. Radiological Asset Core Competencies, continued

Air Samples		X		
Water Samples		X		
Soil Samples		X		
Flora and Fauna		X		
Low Energy Photon Analysis		X		
Beta and Alpha Analysis		X		
Internal Deposition Assessment				
Lung Counting		X	X	
Whole Body Counting				
Human Urine and Feces		X		
Bulk Dosimetry Issue		X		
Personnel Decon (External)				
Perform		X		
Manage	X	X	X	
Personnel Decon (Internal)	X	X	X	
Personnel Decon (Wounds)	X		X	
Site Restoration Software	X		X	
HPAC*				
Plume Prediction	X	X	X	X
Health Physics Interpretation	X	X	X	X
Casualty Tracking Software	X		X	
Waste Disposal Advice	X	X	X	X

*Provided by the DTRA's CMAT

C2.2.4. DOE/NNSA Assets and Resources

C2.2.4.1. DOE/NNSA FRMAC. (702) 295-1381.

C2.2.4.1.1. Requests for assistance may be directed to the DOE HQ/EOC, (202) 586-8100.

C2.2.4.1.2. Figure C2.F18., below, shows the mission, deployment timeframe, and capabilities of the FRMAC.

Figure C2.F18. Mission, Deployment Timeframe, and Capabilities of the FRMAC

FRMAC Mission
The FRMAC is a deployable, tailored capability to collect, analyze, evaluate, assess, interpret, and distribute off-site radiological monitoring and assessment information in support of the LFA, involved State(s), and Tribal governments. The FRMAC coordinates the Federal resources used in responding to the off-site monitoring and assessment needs at the scene of a radiological emergency during a domestic event.
Deployment Timeframe
The FRMAC initial phase may deploy within 4 hours of notification and reach any location in the United States within 6-10 hours. The FRMAC may operate at its full capability within 24-36 hours.

Figure C2.F18. Mission, Deployment Timeframe, and Capabilities of the FRMAC, continued

Capabilities
During an emergency, the FRMAC may provide: • 15 to more than 150 scientists, technicians, and support personnel • Rapid deployment from Nellis AFB • Radiological monitoring and assessment equipment, mobile laboratories, and records management systems • Radiological monitoring and sampling • Database and Geographic Information System support to document and display data • Radiological assessment expertise

C2.2.4.2. DOE/NNSA AMS

C2.2.4.2.1. Located at Nellis AFB, NV, and Andrews AFB, MD, (702) 295-1381.

C2.2.4.2.2. Requests for assistance may be directed to the DOE HQ/EOC, (202) 586-8100.

C2.2.4.2.3. Figure C2.F19., below shows the mission, deployment timeframe, and capabilities of the AMS.

Figure C2.F19. Mission, Deployment Timeframe, and Capabilities of the AMS

AMS Mission
The AMS is a deployable capability to detect, measure, and track ground and airborne radioactivity over large areas using both fixed and rotary wing aircraft.
Deployment Timeframe
The AMS may arrive on-site 6-12 hours after notification
Capabilities
During an emergency the AMS may provide: • 5-10 scientists, technicians, and pilots • Fixed and rotary wing aircraft (currently four helicopters and three airplanes) and ground support vehicles • Real-time plume sampling, aerial assessment, and level of ground contamination and confirmed data on which to base protective actions • Detailed mapping of contamination deposition • Aerial photography and video • Capability to conduct real-time plume sampling • Multi-spectral analysis

C2.2.4.3. DOE/NNSA ARAC

C2.2.4.3.1. Located at the Lawrence Livermore National Laboratory (LLNL), CA, 24-hour Emergency Only Commercial (925) 422-9100.

C2.2.4.3.2. Requests for assistance may be directed to the DOE HQ/EOC, (202) 586-8100.

C2.2.4.3.3. Figure C2.F20., below, shows the mission, deployment timeframe, and capabilities of the ARAC.

Figure C2.F20. Mission, Deployment Timeframe, and Capabilities of the ARAC

ARAC Mission
The ARAC is the DOE/NNSA National Response Capability for real-time computer modeling to assess events involving the release of hazardous radiological materials into the atmosphere. The ARAC's centralized computer-based system provides realistic plots, or maps, of potential radiation dose and exposure assessments, and estimates of the path of nuclear contaminants released into the atmosphere. Further information may be found at: http://narac.llnl.gov.
Deployment Timeframe
The ARAC capability may deploy 2-6 hours after notification
Capabilities
During an emergency, the ARAC may provide: • Remote support from the LLNL • Products showing the health and safety consequences from any hazardous atmospheric release(s) using real-time meteorological data in a 3-D computer model • Consequence forecasts out to 2 days into the future • Predictive products in support of operations such as weapon movements • Comparisons of predictive products with DTRA JNACC predictions

C2.2.4.4. DOE/NNSA ARG

C2.2.4.4.1. Located at Albuquerque Operations Office, Los Alamos National Laboratory, Sandia National Laboratories (SNL) and the Pantex Plant (assets depart from Kirtland AFB); the LLNL (assets depart from Travis AFB); and the Remote Sensing Laboratory (assets depart from Nellis AFB). Commercial: (505) 845-4667.

C2.2.4.4.2. Requests for assistance may be directed to the DOE HQ/EOC, (202) 586-8100.

C2.2.4.4.3. Figure C2.F21., below, shows the mission, deployment timeframe, and capabilities of the ARG.

Figure C2.F21. Mission, Deployment Timeframe, and Capabilities of the ARG

ARG Mission
The ARG is a deployable, tailored capability to manage the technical resolution of accidents or significant incidents involving U.S. nuclear weapons that are in DOE/NNSA custody when the accident or incident occurs. The ARG also provides timely, worldwide support to the Department of Defense in resolving accidents and significant incidents involving U.S. nuclear weapons in Department of Defense custody. The ARG is comprised of scientists, engineers, technicians, and health physics and safety professionals from the DOE/NNSA's national laboratories and production facilities. ARG members deploy with highly specialized, state-of-the-art equipment that shall be used in monitoring, assessing, rendering safe, packaging, and removing nuclear weapons, components, or debris.
Deployment Timeframe
The ARG is deployed in 4 phases: Phase 1: 1-4 hours after notification Phase 2: 2-6 hours after notification

Figure C2.F21. Mission, Deployment Timeframe, and Capabilities of the ARG, continued

Phase 3: 8 hours after notification Phase 4: When called on, but no sooner than 12 hours
Capabilities
During an emergency, the ARG may provide: • 15 to more than 150 nuclear weapons accident responders and scientists • Rapid deployment from Kirtland AFB, Nellis AFB, and Travis AFB • Radiological detection and monitoring equipment • Mobile laboratories • Equipment for weapons access, destructive and non-destructive recovery, and packaging (materials and containers) • CCS • Expertise in nuclear weapons safing and recovery, collection, component identification, and packaging

C2.2.4.5. DOE/NNSA RAP

C2.2.4.5.1. RAP-1. Located at the DOE Brookhaven Area Office, Brookhaven, NY. (631) 344-2200.

C2.2.4.5.2. RAP-2. Located at the DOE Oak Ridge Operations Office, Oak Ridge, TN. (865) 576-1005.

C2.2.4.5.3. RAP-3. Located at the DOE Savannah River Operations Office, Savannah River, SC. (803) 725-3333.

C2.2.4.5.4. RAP-4. Located at the DOE Albuquerque Operations Office, Albuquerque, NM. (505) 845-4667.

C2.2.4.5.5. RAP-5. Located at the DOE Chicago Operations Office, Chicago, IL. (630) 252-4800.

C2.2.4.5.6. RAP-6. Located at the DOE Idaho Operations Office, Idaho Falls, ID. (208) 526-1515.

C2.2.4.5.7. RAP-7. Located at the DOE Oakland Operations Office, Oakland, CA. (925) 422-8951.

C2.2.4.5.8. RAP-8. Located at the DOE Richland Operations Office, Richland, WA. (509) 373-3800.

C2.2.4.5.9. The DOE RAP may be contacted directly for assistance, or requests for assistance may be directed to the DOE HQ/EOC, (202) 586-8100.

C2.2.4.5.10. Figure C2.F22., below, shows the mission, deployment timeframe, and capabilities of the DOE's RAP.

Figure C2.F22. Mission, Deployment Timeframe, and Capabilities of the DOE's RAP

RAP Mission
RAP is a deployable, tailored capability providing radiological assistance to Federal Agencies; State, local, and Tribal governments; and to private businesses or individuals for incidents involving radiological materials. RAP is coordinated and implemented on a regional basis from eight Regional Coordinating Offices (RCO) in the United States.
Deployment Timeframe
RAP teams may deploy within their respective regions within 4-6 hours after notification.
Capabilities
During an emergency, RAP may provide: • Three RAP teams per region, appropriately trained and equipped to respond to all types of radiological events. Each team consists of 7 people: Team Leader, Team Captain, Public Information Officer, and four Technicians • Radiological monitoring and assessment equipment including alpha, beta, gamma, and neutron detectors; air samplers; decontamination kits; communications equipment; and mobile laboratories • initial responders for characterizing the radiation environment and reducing the immediate radiological hazards and risk to people and the environment • Personnel decontamination support

C2.2.4.6. DOE/NNSA REAC/TS

C2.2.4.6.1. For more information contact:
Oak Ridge Institute for Science and Education
Attn: Pat Cooley
P.O. Box 117, MS 39
Oak Ridge, TN 37831-0117
Phone: (865) 576-3131 or (865) 481-1000 (24-hour number-Methodist Medical Center Disaster Network)
Fax: (865) 576-9522

C2.2.4.6.2. Figure C2.F23., below, shows the mission, deployment timeframe, and capabilities of the REAC/TS.

Figure C2.F23. Mission, Deployment Timeframe, and Capabilities of the REAC/TS

REAC/TS Mission
A medical consulting and/or deployable, tailored capability to provide a 24-hour response center consisting of consulting and/or deployable equipment and personnel. The REAC/TS is trained and experienced in the treatment of radiation exposure to assist Federal, State, local, and Tribal governments, and other DOE/NNSA radiological emergency response assets. The REAC/TS provides medical advice, specialized training, and the unique capability of on-site assistance in triage, diagnosis, and treatment of all types of radiation exposure events.
Deployment Timeframe
CONUS: 4 hours OCONUS: 6 hours
Capabilities
During an emergency, the REAC/TS may provide: • 24-hour emergency medical consultation support • Four to 30 deployable medical personnel capable of providing radiation exposure medical support

Figure C2.F23. Mission, Deployment Timeframe, and Capabilities of the REAC/TS, continued

• 7 days' worth of deployable medical supplies • Expertise on treating exposed personnel and handling contamination injuries • Medical support and advice to deployed DOE/NNSA elements

C2.2.4.7. DOE/NNSA CMPT

C2.2.4.7.1. Contact Info. N/A, DOE/NNSA internal; contact the DOE HQ/EOC, (202) 586-8100, for more information.

C2.2.4.7.2. Figure C2.F24., below, shows the mission, deployment timeframe, and capabilities of the CMPT.

Figure C2.F24. Mission, Deployment Timeframe, and Capabilities of the CMPT

CMPT Mission
The CMPT shall deploy highly specialized DOE/NNSA planning expertise, as required. The team is comprised of scientists and operational planners with specific expertise in effects modeling, radiation monitoring and assessment, PAGs, and logistics planning. When a Joint Task Force-CM or a JTF-CS is established by the Department of Defense, the team may integrate and prove technical and scientific liaison with the military and other Federal Agencies.
Deployment Timeframe
The CMPT may deploy within 4 hours.
Capabilities
During an emergency, the CMPT may provide: • Expertise on: Federal requirements and guidance on CM responses and activities; DOE/NNSA resources; protective measures; and radiation monitoring, assessment, and analysis • Preparation for deployment within 4 hours of notification

C2.2.4.8. DOE/NNSA CMHT

C2.2.4.8.1. Contact Info. N/A, DOE/NNSA internal; contact the DOE HQ/EOC, (202) 586-8100, for more information..

C2.2.4.8.2. Figure C2.F25., below shows the mission, deployment timeframe, and capabilities of the CMHT.

Figure C2.F25. Mission, Deployment Timeframe, and Capabilities of the CMHT

CMHT Mission
Once notified of the deployment of any CM response elements, the DOE, Nevada (DOE/NV), EOC is activated and home teams are established at Remote Sensing Laboratory and SNL. Once field elements start generating data, the home teams shall incorporate the data to normalize the initial predictions and develop data products that may be distributed to all DOE/NNSA elements needing access.
Deployment Timeframe
The CMHT shall be established within 1-2 hours.
Capabilities
During an emergency, the CMHT may provide:

Figure C2.F25. Mission, Deployment Timeframe, and Capabilities of the CMHT, continued

• The deployed elements with access to early effects predictions and reports • A link through the Emergency Communications Network (ECN) with the DOE/NV EOC

C2.2.4.9. DOE/NNSA CMRT: Phase I (CMRT I)

C2.2.4.9.1. Contact Info. N/A, DOE/NNSA internal; contact the DOE HQ/EOC, (202) 586-8100, for more information.

C2.2.4.9.2. Figure C2.F26., below, shows the mission, deployment timeframe, and capabilities of the CMRT I.

Figure C2.F26. Mission, Deployment Timeframe, and Capabilities of the CMRT I

CMRT I Mission
The CMRT I serves as a quick response element to supplement RAP in domestic responses and shall be the initial operational response element for foreign deployments. The team shall incorporate all the disciplines necessary to support long-term operations.
Deployment Timeframe
The CMRT I is prepared to deploy within 4 hours of notification.
Capabilities
During an emergency, the CMRT I may provide: • Support to 12-hour operations, but may be configured to support 24-hour operations on a limited basis • Radiation monitoring, sampling, analysis, assessment, health and safety, and support and logistics functions

C2.2.4.10. DOE/NNSA CMRT: Phase II (CMRT II)

C2.2.4.10.1. Contact Info. N/A, DOE/NNSA internal; contact the DOE HQ/EOC, (202) 586-8100, for more information.

C2.2.4.10.2. Figure C2.F27., below, shows the mission, deployment timeframe, and capabilities of the CMRT II.

Figure C2.F27. Mission, Deployment Timeframe, and Capabilities of the CMRT II

CMRT II Mission
The CMRT II is comprised of all CM resources within DOE/NNSA. The team is customized to fit the needs of each response, supplementing a first response element such as the RAP, CMRT I, AMS, or CMPT. The CMRT II is designed to support FRERP and non-FRERP responses and combines similar disciplines as those found on the CMRT I, but with significantly more capability.
Deployment Timeframe
The CMRT II is prepared to deploy within 6 hours of notification.
Capabilities
During an emergency, the CMRT II may provide: • Support and logistics equipment, maintained to accommodate any combination of the response elements listed above in the CMRT II Mission and pre-packaged for quick response in a modularized

Figure C2.F27. Mission, Deployment Timeframe, and Capabilities of the CMRT II, continued

fashion
- Monitoring, sampling, analysis, and assessment resources, drawn from the CMRT I, RAP, and AMS

C2.2.5. Other Agencies. Table C2.T4., below, shows other Agencies and their contact phone numbers.

Table C2.T4. Other Agencies

Department of Health and Human Services (HHS)	Commercial (202) 857-8400
Center for Disease Control and Prevention (CDC)	Commercial (404) 639-3235
EPA	Commercial (202) 475-8383
NRC	Commercial (301) 816-5100 Backup (301) 415-0550

C2.2.6. Other Assets, Resources, and Points of Contact

C2.2.6.1. The DOE/NNSA. Table C2.T5., below, shows the DOE emergency response contact and telephone number.

Table C2.T5. DOE Contacts

DOE Defense Program Office of Emergency Response, Directorate of Training and Administration (NA-40)	Commercial (301) 903-3558

C2.2.6.2. The Department of Defense. Table C2.T6., below, shows DoD contacts and their telephone numbers.

Table C2.T6. DoD Contacts

Joint Staff Contingency Support Division (Joint Chiefs of Staff-controlled contingency communications)	DSN 227-0007
JCSE	DSN 968-4141
Joint Chiefs of Staff Controlled Tactical Communications Assets	DSN 879-6591/6925
AFRRI MRAT	DSN 295-0530 Commercial (301) 295-0530
AFIOH	Central Time Zone duty hours DSN 240-3486 Commercial (210) 5363486 After duty hours Brooks AFB Command Post

Table C2.T6. DoD Contacts, continued

	DSN 240-3278 Commercial (210) 536-3278
Chemical Biological Incident Response Force (U.S. Marine Corps)	DSN 751-9067 Commercial (910) 451-9067
U.S. Army Guardian Brigade (contact for Technical Escort Unit Assets)	Army Operations Center DSN 227-0218 Commercial (703) 697-0218

C3. CHAPTER 3

U.S. TERRITORY NUCLEAR WEAPON ACCIDENT RESPONSE PHASE I: NOTIFICATION AND DEPLOYMENT

C3.1. OVERVIEW

The notification and deployment phase of a nuclear weapon accident begins once the accident has occurred and voice reports are provided to the NMCC or the DOE HQ/EOC. This phase draws down as increasing numbers of response forces arrive on-site. Actions taken during this phase include notifying appropriate Federal, State, and local authorities; ensuring coordination and communication between the Department of Defense, the DOE/NNSA, and the two departments' sub-organizations; and executing logistics plans to deploy assets to the accident site. The following notification procedures, listed in section C3.2., are based on recognized reporting channels. However, depending on the circumstances of the accident, notification may come first from civilian responders or local populations who witnessed the accident.

C3.2. DEPARTMENTAL NOTIFICATION

For any nuclear weapon accident, notification of the accident shall be reported to the NMCC or the DOE HQ/EOC, depending on which department has custody of the weapon involved in the accident.

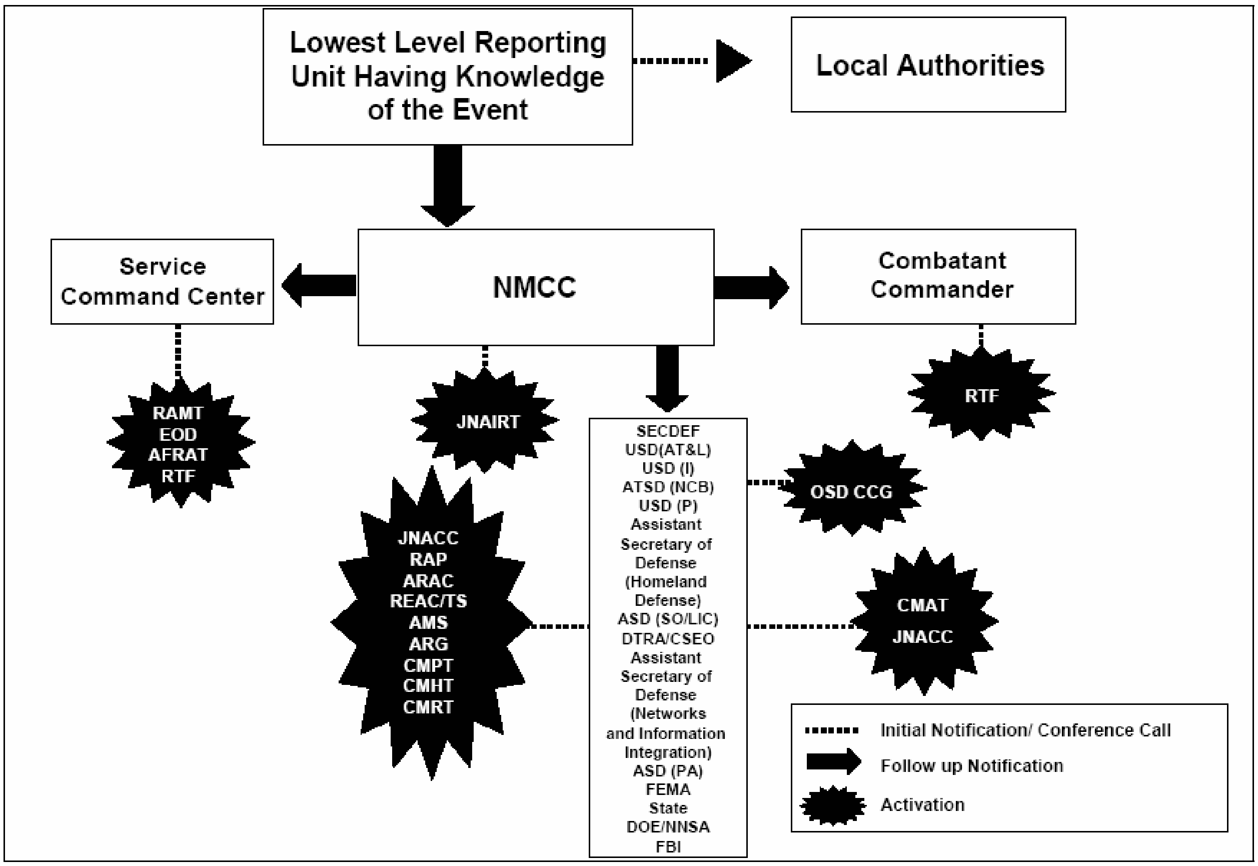
C3.2.1. Weapon in DoD Custody. The lowest level of command having knowledge of the accident and access to communications provides the OPREP-3 PINNACLE BROKEN ARROW voice report to the NMCC within 15 minutes of accident occurrence, in accordance with Chairman of the Joint Chiefs of Staff Manual 3150.03B, (reference (u)). A hard copy message report shall be communicated to the NMCC within 1 hour of accident occurrence to amplify conditions at the accident scene and to give an updated status of response actions.

C3.2.1.1. The NMCC, on receipt of the voice report, shall convene a conference call with all appropriate national level officials and Agencies, including operations centers of the Military Services, the appropriate Combatant Commands, the JFCOM, the DTRA, the DHS FEMA, the DOS, the DOE, the Department of Justice (FBI), and other Federal Agencies, as appropriate. This conference call is designed to notify and activate the national level response and to activate their nuclear accident response plans and organizations in support of the appropriate Combatant Command.

C3.2.1.2. The NMCC shall also notify the SECDEF; the DEPSECDEF; the White House Situation Room; the ATSD(NCB); the ASD(SO/LIC); the Assistant Secretary of Defense for Homeland Defense; the Under Secretary of Defense for Intelligence (USD(I)), and other appropriate offices and Agencies.

C3.2.1.3. The NMCC and/or the Combatant Command, through Service Operations Centers, shall immediately activate and dispatch an IRF cadre to take immediate life saving actions and to establish security and safety controls at the accident scene. Where the accident has occurred off a U.S. Military reservation, early coordination with civil police and fire and rescue personnel is essential to public health, safety, and security as well as the security of nuclear weapon(s) and weapons components. The appropriate Combatant Commander, in coordination with the NMCC, shall designate a Flag Level Officer as the OSC responsible for the overall response to the accident.

Figure C3.F1. DoD Notification and Activation Flow (U.S. territory)



C3.2.2. Weapon in DOE/NNSA Custody. For an accident involving the DOE's Office of Transportation Safeguards cargo vehicles, notification flows through the Albuquerque Operations Office 24-hour Secure Communications office to the DOE HQ. The DOE HQ/EOC shall request DoD support through the NMCC, if required.

C3.3. ACTIVATION AND DEPLOYMENT

C3.3.1. The Department of Defense. When a BROKEN ARROW is confirmed, the NMCC may activate the Joint Staff's JNAIRT. Headed by the J-3, the JNAIRT is composed of all staff elements that are likely to have a role in the DoD response to the accident. After notifications are made, the NMCC shall maintain an open line with the reporting accident site and other interested parties that wish to stay on the line such as the Service Operations Center, the DTRA/CSEO, the DOE HQ/EOC, the Homeland Security Operations Center, and Combatant Commander operations centers. When the Department of Defense is the LFA, the NMCC shall request DOE/NNSA assets for deployment through the DOE HQ/EOC as they are needed.

C3.3.1.1. OSD ESC. The OSD ESC is likely to activate the OSD CCG. The OSD CCG shall convene for the OSD principals to exchange information and coordinate on policy matters that may arise as details become known and FRPs are put into effect. The OSD CCG is not in the chain of command and shall rely on the JNAIRT for current information. Its focus shall be on policy matters, public affairs, DoD liabilities, and budget issues.

C3.3.1.2. DTRA/CSEO. When notified of the BROKEN ARROW, the DTRA/CSEO shall, through the respective Service Operations Centers, alert the various DoD specialized teams that may be called on to respond to the accident. Internally, the DTRA/CSEO shall activate the DTRA CMAT and activate its internal CAT known as the JNACC. The DTRA/CSEO and the JNACC shall also contact and establish coordination links with the DOE/NNSA JNACC at the DOE's Albuquerque Operations Office. The DTRA/CSEO shall task DTRA modeling resources to generate fallout plumes using a 5-day forecast or observed weather data. The DTRA/CSEO shall forward these plume predictions to the IRF and the OSC as quickly as possible to assist with response management area setup.

C3.3.1.3. IRF. An IRF shall usually be dispatched from the nearest military installation having a disaster response capability. This installation need not have a nuclear mission or radiological responsibility, but its IRF must accomplish certain minimum functions. If more than one installation is an equal distance from the accident, an IRF from the installation having the better capability shall be deployed in accordance with the current Nuclear Accident Response Capabilities Listing, as published and distributed by the DTRA (Defense Special Weapons Agency (now the DTRA) 5100.52.1-L (reference (v)). The IRF may be directed to deploy by a Combatant Commander, the NMCC, or the installation commander. IRF personnel may become part of the RTF.

C3.3.1.3.1. IRF Minimum Composition. The IRF should contain at least the following specialties (preferably with knowledge and training in radiological hazards and emergency response procedures):

C3.3.1.3.1.1. Command element.

C3.3.1.3.1.2. Medical, fire, and rescue elements.

C3.3.1.3.1.3. Security element.

C3.3.1.3.1.4. EOD element.

C3.3.1.3.1.5. Communications element.

C3.3.1.3.1.6. Public affairs element.

C3.3.1.3.2. IRF Extended Composition. If available, the IRF should contain these specialties, in addition to the above:

C3.3.1.3.2.1. Weapons maintenance specialists.

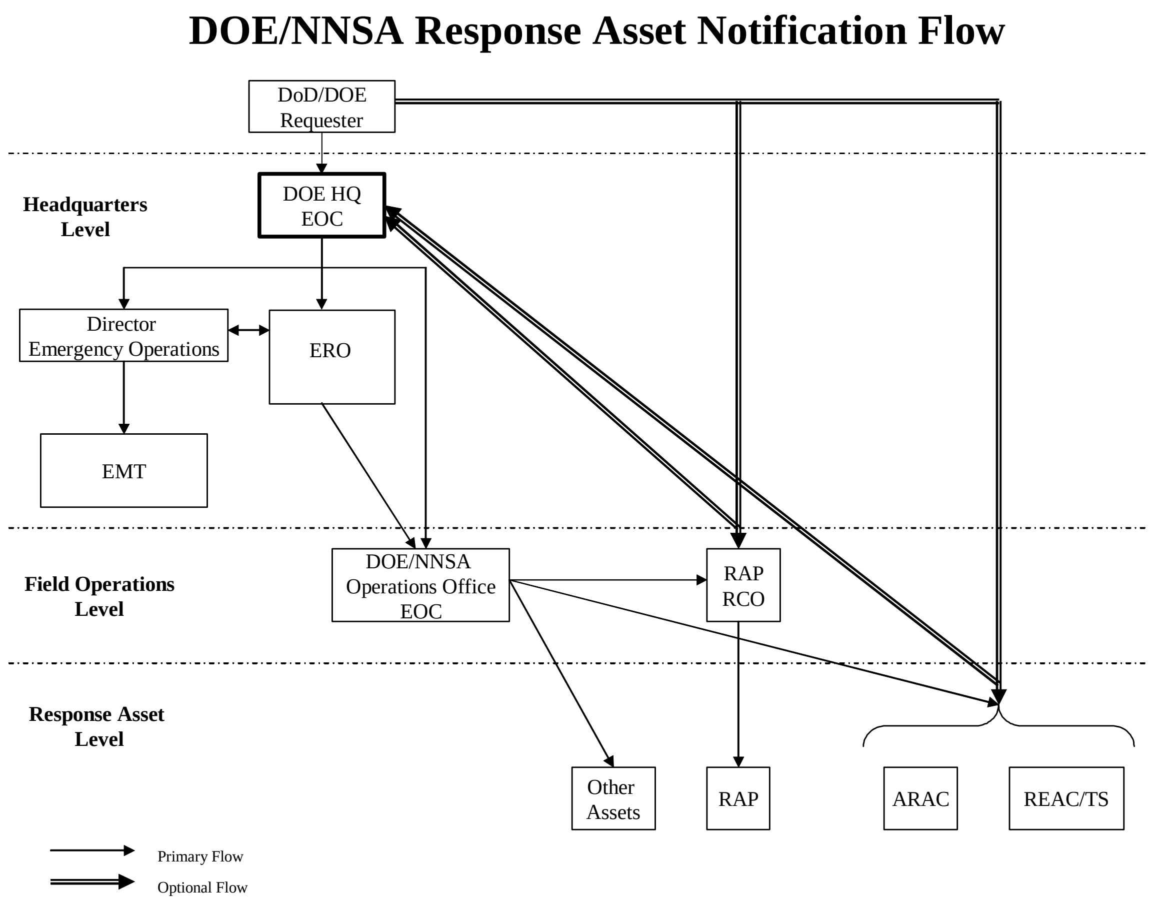
C3.3.1.3.2.2. Legal element.

C3.3.1.3.2.3. Engineering element.

C3.3.1.3.2.4. Radiological hazard control element.

C3.3.2. The DOE/NNSA. Requests for DOE/NNSA radiological emergency response asset support are forwarded to the DOE HQ/EOC which then notifies the program Duty Officer, the Director of the Office of Emergency Operations, and the appropriate Operations Office(s) EOC. Once notified, the Director of the Office of Emergency Operations response activities include deciding whether a HQ/EMT is necessary. The program Duty Officer notifies the asset's Emergency Response Officer (ERO), who then coordinates with and through the appropriate Operations Office, assesses the situation, and assures the radiological emergency response asset(s) is notified. The DOE/NNSA's response asset notification flow, under current DOE policy, is shown in figure C3.F2., below.

Figure C3.F2. DOE/NNSA Response Asset Notification Flow



C3.3.3. DOE Policy for DOE/NNSA Response Asset Activation, Deployment, and Deployment Authorization. Deployment of any DOE/NNSA response asset may only occur with a valid deployment order from the DOE HQ EMT ERO or a RAP RCO. (The RAP RCO may only deploy a RAP team.) This authorization may be issued formally, through a deployment order, or verbally directed to a particular Field Manager for DOE/NNSA Operations responsible for deploying the asset(s).

C3.3.3.1. Phased Deployment. DOE/NNSA asset deployment is tailored based on the event and the needs of other Federal, State, and local responders. DOE policy provides that the DOE/NNSA first deploys C2, logistics, and initial technical support. Additional technical support shall follow as the SEO, in coordination with the DOE HQ and/or the DoD OSC, decides what further resources are to be deployed to the scene. Throughout this process, the DOE/NNSA's role includes continually assessing the emerging event to decide what and when additional resources are necessary. To ease this deployment philosophy, many of the DOE/NNSA response assets use a phased response approach to any emergency to effectively and efficiently organize and deploy their resources as directed by the SEO.

C3.3.3.2. ARG Phased Deployment. ARG Phase 1 provides DOE/NNSA C2 presence; begins interfacing with other Federal, State, and local agencies; and prepares to support future, follow-on ARG phases. Phase II provides personnel to conduct a one-shift operation and conduct "triage" on weapon(s) involved in an accident. Phase III provides personnel and resources to sustain 24-hour operations. Phase IV provides additional personnel and resources for extended deployment.

C3.3.3.3. FRMAC/Radiological Monitoring and Assessment Center (RMAC) Phased Deployment. FRMAC operations are divided into three phases for a domestic response and two phases for an RMAC international response. Phase I provides a rapid initial response capability to interface with States, the LFA, the DOS, or DoD officials. Phase II provides a greater monitoring capability; establishes additional voice, data, and fax links; and completes preparations for a FRMAC Phase III response. Phase III, which only applies to a domestic response, provides long-term monitoring and assessment during the latter part of the emergency phase and into the post-emergency phase. For post-emergency operations, the management of the FRMAC is transitioned to the EPA.

C4. CHAPTER 4

U.S. TERRITORY NUCLEAR WEAPON ACCIDENT RESPONSE PHASE II: INITIAL RESPONSE

C4.1. OVERVIEW

The Initial Response phase to a domestic nuclear weapon accident begins when the accident occurs. The response is comprised chiefly of actions by fire and rescue, emergency medical, and law enforcement personnel whose response actions focus on treating and rescuing people involved. The first responders may be civilian, military (IRF), or a combination of both. Early in this phase initial response resources are established and the OSC arrives at the accident scene. During this phase, under current policy, The Department of Defense and the DOE/NNSA come together to form a Unified Command to organize and carry out the Federal Government's response. Actions taken during the initial response phase may include, but are not limited to, lifesaving activities, firefighting activities, establishing C2, public protection measures (State and local responsibility), and providing for necessary operational security. See Chapter 9 for guidance on how to use the procedures set forth in this Chapter, and for additional procedures that apply when responding to a nuclear weapons accident outside the United States.

C4.2. LFA OSC RESPONSIBILITIES

The LFA OSC marshals DoD and DOE/NNSA assets to carry out the Federal response. The LFA OSC shall operate out of the Joint Operations Center (JOC). Senior leadership may co-locate near the JOC to execute the Government's response, as directed by the OSC. The senior leadership includes the OSC, the SDO, the SEO, the DOE/NNSA HQ EMT, and necessary staff members.

C4.2.1. OSC Responsibility When the Department of Defense is the LFA. The IRF Commander fulfills the OSC role until relieved by the RTF. Once the response is underway, a Combatant Commander shall dispatch an RTF to relieve the IRF, in accordance with reference (a). Once the RTF arrives at the accident site, the RTF Commander assumes the role of OSC.

C4.2.2. OSC Responsibility When the DOE/NNSA is the LFA. During a radiological emergency for which the DOE is the LFA, the DOE/NNSA provides an OSC to coordinate the Federal response. An SEO is assigned for any response involving the deployment of the emergency response assets. The SEO is the DOE person responsible for coordinating and using the DOE emergency response assets at the scene of a radiological event. The SEO provides the critical direct interface between the OSC and the DOE's field technical response assets. The SEO also provides DOE field management oversight to DOE response assets; coordinates DOE activities with the OSC and Federal, State, local, and other response organizations; and is usually the focal point for the DOE on scene. The SEO shall report to the lead agency official responsible for the overall response.

C4.3. COORDINATION OF RESOURCES BETWEEN THE DEPARTMENT OF DEFENSE AND THE DOE/NNSA

C4.3.1. When the Department of Defense is the LFA, the OSC shall marshal DOE/NNSA response assets through the SEO who shall then forward that request through the DOE JNACC. The SEO shall manage these assets on-scene.

C4.3.2. When the DOE/NNSA is the LFA, the OSC marshals DoD response assets through the SDO who shall request these assets through the DoD NMCC. The SDO shall manage these assets on-scene.

C4.4. LFA OSC IRF COMPOSITION

To conduct the initial response, the LFA OSC should have the following specialties:

C4.4.1. Command element.

C4.4.2. Medical, fire, and rescue elements.

C4.4.3. Security element.

C4.4.4. EOD element.

C4.4.5. Communications element.

C4.4.6. Public affairs element.

C4.5. LFA OSC IRF FOLLOW-ON COMPOSITION

When available, the OSC should incorporate these specialties, in addition to those listed in section C4.4., above:

C4.5.1. Weapons maintenance specialists.

C4.5.2. Legal element.

C4.5.3. Engineering element.

C4.5.4. Radiological hazard control element.

C4.5.5. Radiation monitoring element

C4.6. LFA OSC IRF FUNCTIONS

Follow-on resources shall supplement the LFA OSC throughout the response. See figure C1.F4., above, for a notional timeline detailing the arrival of response assets on-site. The LFA OSC should work to ensure that the following tasks are completed during the initial response phase of the accident:

C4.6.1. Establish C2 at the Scene. C2 is usually established by the LFA OSC and supporting elements; however, C2 shall initially be established by the first responders, including State and/or local officials, at the accident scene until the arrival of the LFA OSC.

C4.6.2. Establish Contact with HQ. When the Department of Defense is the LFA, the OSC shall establish contact with the NMCC. When the DOE/NNSA is the LFA, the OSC shall establish contact with the DOE/NNSA HQ/EOC. Once notified, the NMCC and the responsible Combatant Command or the DOE/NNSA HQ/EOC may best maintain the needed contact by keeping open communications with the reporting unit, and immediately reestablishing this link, if broken. HQ shall determine when this conference may be ended.

C4.6.3. Extinguish Fires. Local firefighting capabilities may be used. If the weapon is exposed to high temperatures, civilian fire departments shall require advice on proper cooling of the weapon.

C4.6.4. Rescue, Stabilize, and Evacuate Casualties. Local ambulances and hospitals may be used. Casualties need not be decontaminated before evacuation, transport to medical facilities, or treatment; however, be careful to reduce the spread of contamination. Decontamination shall occur when casualties are medically stabilized. Ambulances departing with casualties shall not be decontaminated. Although it must be anticipated that such actions may spread contamination to a medical facility, it is unlikely to pose a significant threat to medical personnel and is appropriate when life-threatening injuries exist. Responding medical personnel should not be denied access to the accident site for reasons of security, potential explosive hazards, or the nature of the accident, but should try to coordinate with EOD personnel, when available, and have the OSC's permission. If possible, EOD personnel should mark a clear path or accompany emergency medical personnel into the accident site to help avoid radioactive, explosive, and toxic hazards.

C4.6.5. Establish an NDA or NSA, in accordance with DoD Directive 5200.8 (reference (w)). If military security forces are unavailable or insufficient, local law enforcement personnel may be asked to restrict entry to the area until an NDA or NSA is established. Figure C4.F1., below, shows a notional accident site and the security concepts that should be used. It is important to note that winds may shift, requiring relocation of key assets. Local weather history should be queried to learn the best location of assets.

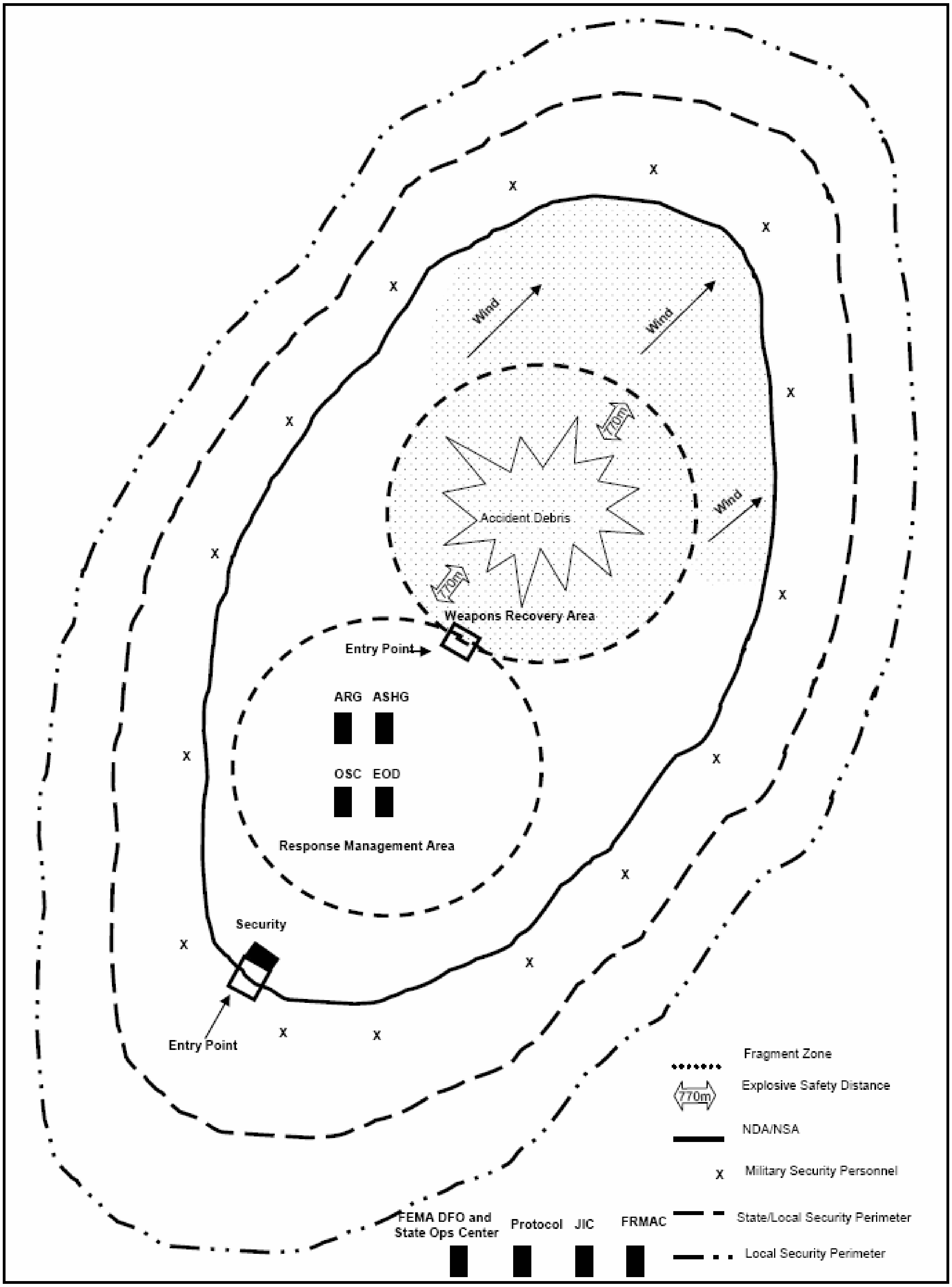
C4.6.6. Secure the airspace over the accident site through the Federal Aviation Administration.

C4.6.7. Assess the status of weapons and report this information to the NMCC and the DOE/NNSA HQ/EOC.

C4.6.8. If EOD assets are available; perform Initial RSPs only. EOD personnel should not be denied access to the accident site for reasons of security. Initial RSPs take priority over security and PRP requirements. However, to the maximum extent possible, security and PRP requirements shall be met before non-certified personnel are used to make Initial RSPs. Beyond Initial RSPs, EOD personnel perform safing procedures on nuclear weapons only with direct support of the DOE/NNSA ARG.

C4.6.9. Provide a transition brief if the OSC position shifts from the IRF to the RTF during the DoD-led response, or if the SEO assumes the role of OSC during a DOE/NNSA-led response.

Figure C4.F1. Accident Site Organization and Security Layout



C4.7. <u>LFA OSC IRF FOLLOW-ON FUNCTIONS</u>

Depending on the location of the accident, the OSC initially deployed to the scene may be capable of additional initial response actions:

C4.7.1. Establish a temporary CCL, if required.

C4.7.2. Identify a forward operating location, staging area, and reception center for follow-on forces.

C4.7.3. Provide necessary operational security.

C4.7.3.1. Have a security element for perimeter security, entry and exit control, and protection of classified information and property. Coordinate with the Principal Legal Advisor (PLA) to ensure procedures are in place to preserve the site of the accident as a potential crime scene, and that any evidence is properly maintained.

C4.7.3.2. If internal resources are not available, request the assistance of local law enforcement officials to secure the area, prevent unauthorized entry, and remove unauthorized personnel.

C4.7.3.3. Establish an operations area, base camp, and CCA. (See Chapter 10 for detailed procedures.)

C4.7.3.4. Provide appropriate protective equipment for perimeter guards who are posted in a contaminated area. When posting perimeter guards, consider the possibility of contamination of clean areas due to wind shift and re-suspension of contaminants. (See Chapter 10 for detailed procedures.)

C4.7.4. Determine if contamination is present, then identify the nature and location of contaminated areas. The NMCC and the DOE HQ/EOC shall be advised if contamination is or is not detected.

C4.7.4.1. Research and analyze weather conditions to determine how they shall affect the response.

C4.7.4.2. Place air samplers upwind and downwind of the accident site.

C4.7.4.3. Receive and use ARAC plots or HPAC modeling predictions, if previously requested.

C4.7.4.4. Determine the status and location of all radioactive material.

C4.7.4.5. If no radiation was released during the accident, prepare to respond in the event of a release during recovery operations.

C4.7.5. Ensure that information conduits are established.

C4.7.5.1. When the Department of Defense is the LFA, the IRF shall initiate and continue reporting, in accordance with reference (u), until relieved by the RTF. Reports shall not be delayed to gather more information. (See Chapter 10.)

C4.7.5.2. Initiate Public Affairs procedures and establish direct communications with the Office of the ASD(PA) and the DOE/NNSA Office of Public Affairs.

C4.7.5.3. Provide appropriate news releases. (See Appendix 17.)

C4.7.5.4. Confirm the presence of nuclear weapons in accordance with DoD Directive 5230.16 (reference (x)). U.S. Government (USG) policy is to neither confirm nor deny the presence or absence of nuclear weapons at any specific location, but exceptions under reference (x) are allowed when it is necessary to administer public safety actions or to reduce or prevent public alarm.

C4.7.6. Protect the public and lessen health and safety hazards.

C4.7.6.1. Establish the ASHG (detailed purpose and procedures are in Chapter 10).

C4.7.6.2. Coordinate with civil law enforcement agencies and/or host nation law agencies.

C4.7.6.3. Notify officials and personnel of potential hazards.

C4.7.6.4. Identify and decontaminate, as necessary, persons who may have been contaminated. Personnel entering an area that is contaminated, suspected of containing contamination, or who may be contaminated, should wear personal protective clothing and respiratory protection until contamination levels are established. Personnel may then change to the appropriate protective measures for the situation.

C4.7.6.5. Issue PARs (if necessary) to the State and/or local authorities for them to consider what actions must be taken by the public to avoid or reduce exposure to radiation.

C4.8. TRANSITION OF OSC RESPONSIBILITIES

As the response to the accident progresses, follow-on forces shall supplement the initial responders. As part of the supplementation process, the Department of Defense shall deploy an RTF to relieve the IRF, in accordance with reference (a). During this transition, IRF personnel may become part of the RTF. Additionally, SEO responsibilities shall transfer from the RAP team chief to the ARG SEO when the ARG and other DOE/NNSA assets are deployed to the accident scene. To ensure a smooth transition, a changeover briefing should be provided when

there is a change in command from the IRF to the RTF or a change in SEO responsibility. The briefing should include:

C4.8.1. <u>Introduction</u>. Introduction and general situation discussion.

C4.8.2. <u>Weather</u>

C4.8.2.1. Discussion of effect on recovery operations.

C4.8.2.2. Discussion of downwind contamination impact.

C4.8.2.3. Forecast weather including wind direction, precipitation, and lightning activity.

C4.8.3. <u>Intelligence</u>. Discussion of hostile collection or exploitation efforts.

C4.8.4. <u>Operations</u>

C4.8.4.1. Diagram of the accident scene layout.

C4.8.4.2. Location of weapons.

C4.8.4.3. RSPs.

C4.8.4.4. Known or estimated contamination.

C4.8.4.5. Status of PARs that have been issued.

C4.8.4.6. Contamination control procedures in place.

C4.8.4.7. Specialized teams and capabilities present.

C4.8.5. <u>Security</u>

C4.8.5.1. Whether an NDA or NSA has been established.

C4.8.5.2. Interactions with State or local law enforcement.

C4.8.5.3. Badging and access issues.

C4.8.5.4. Rules for Use of Force (RUF).

C4.8.6. <u>Medical</u>

C4.8.6.1. Casualties, injuries, and other contaminated persons.

C4.8.6.2. Status and impact on facilities.

C4.8.7. Legal

C4.8.7.1. Significant or unusual legal activity.

C4.8.7.2. Relationship with Federal and State authorities.

C4.8.7.3. RUF.

C4.8.7.4. Legal basis for the NDA.

C4.8.8. Logistics

C4.8.8.1. Personnel on-site and timelines of those expected to arrive.

C4.8.8.2. Status of messing and billeting.

C4.8.8.3. Status of support infrastructure.

C4.8.9. Public Affairs

C4.8.9.1. Media on-site.

C4.8.9.2. Public awareness and concerns.

C4.8.9.3. Status of the disclosure of nuclear weapons are (or are not) present announcements.

C4.8.10. Communications

C4.8.10.1. Communications assets available.

C4.8.10.2. Status of establishing secure communications.

C4.8.10.3. Extent of any reports that have been made to HQ's elements.

C4.8.11. Relevant presentations by other Federal elements.

C5. CHAPTER 5

U.S. TERRITORY NUCLEAR WEAPON ACCIDENT RESPONSE PHASE III: ACCIDENT SITE CONSOLIDATION

C5.1. OVERVIEW

The arrival of a robust cadre of DoD and/or DOE/NNSA response assets to the accident site marks the beginning of Phase III, Accident Site Consolidation. During a DoD-led response, this is the phase when the RTF arrives at the accident site. The phase begins once the accident scene starts to stabilize and imminent lifesaving and firefighting activities have been completed. Actions taken during this phase may include, but are not limited to, establishing joint DoD-DOE/NNSA centers, offices, and groups to carry through the response; ensuring contamination control; reducing the health and safety risk to the public and response personnel; removing hazards; solidifying security measures; performing initial and follow-on RSPs; addressing public affairs issues; and initiating planning activities for SR. See Chapter 9 for guidance on how to use the procedures set forth in this chapter and for additional procedures that apply when responding to a nuclear weapons accident outside the United States.

C5.2. ARRIVAL OF THE OSC

When the Department of Defense is the LFA, the OSC is organized by the Combatant Commander responsible for responding to the accident by deploying an RTF, in accordance with reference (a). The RTF Commander shall relieve the IRF Commander as OSC, once on-site. When the DOE/NNSA is the LFA, the facility manager, site manager, or convoy commander who had custody of the weapon during the accident becomes the OSC until the SEO arrives on-site. In either event, under DoD and DOE policy, the OSC shall be organized according to the general composition listed in section C5.3. and illustrated in figure C5.F1., below. The OSC tasks his or her parent department in accordance with reference (e). The SEO/SDO of the supporting agency tasks his or her parent department in accordance with reference (e).

C5.3. LFA OSC GENERAL COMPOSITION

The LFA OSC shall consist of the following elements:

C5.3.1. Safety.

C5.3.2. Medical.

C5.3.3. Security.

C5.3.4. EOD.

C5.3.5. Communications.

C5.3.6. Public Affairs.

C5.3.7. Legal.

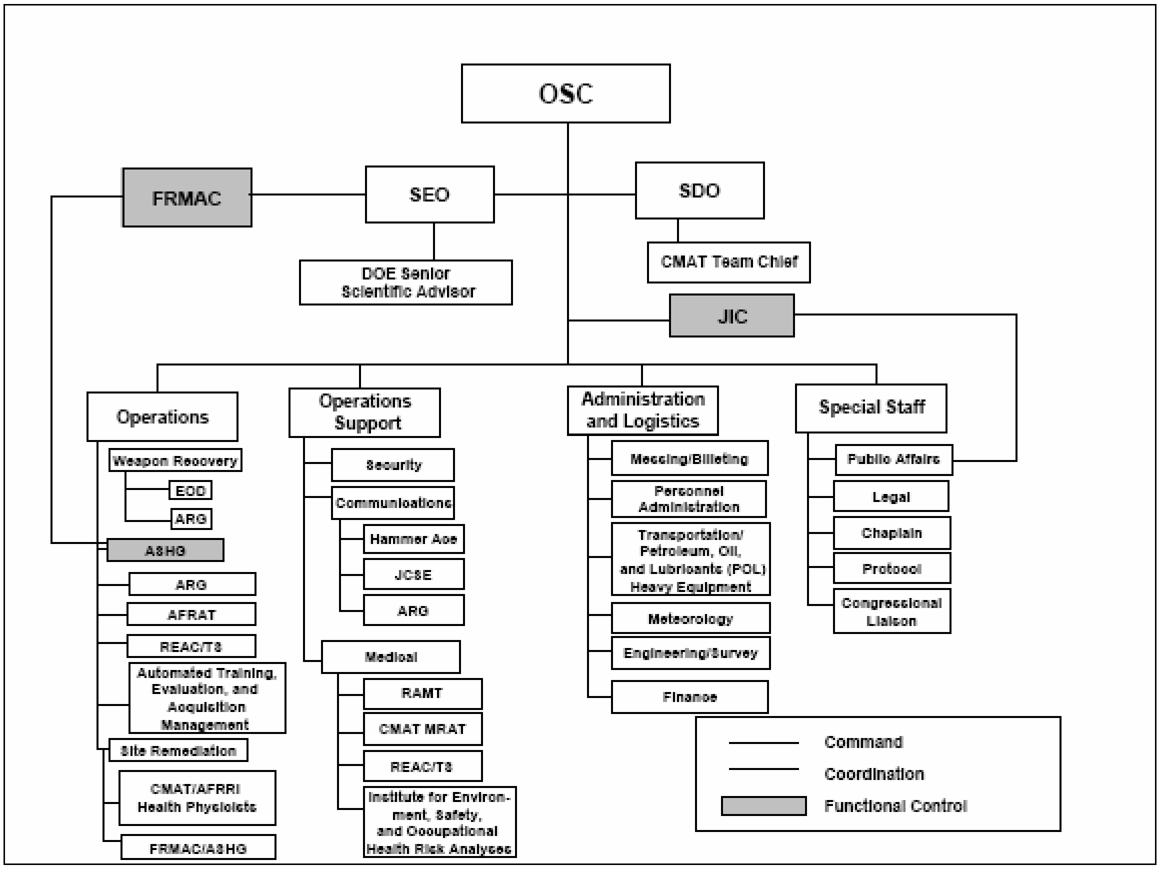
C5.3.8. Logistics.

C5.3.9. Protocol.

C5.3.10. Financial.

C5.3.11. Contracting.

Figure C5.F1. <u>OSC General Composition</u>



C5.4. <u>LFA OSC RESPONSIBILITIES</u>

During Phase III of the response, the LFA OSC should:

C5.4.1. Establish priorities for recovering radiological material.

C5.4.2. Prioritize all other requests for emergency support, secondary emergencies, and logistic requirements.

C5.4.3. Establish the JOC.

C5.4.4. Establish the JIC.

C5.4.5. Establish a combined ASHG. (See Chapter 10, figure C10.F1.)

C5.4.6. If possible, establish the Joint Legal Claims Office.

C5.4.7. Establish the Joint Security Control Center (JSCC).

C5.4.8. Continue IRF activities, as required, and accomplish any actions usually performed by the IRF that are not yet completed.

C5.4.9. If needed, ensure or establish secure communications with the NMCC and the DOE HQ/EOC.

C5.4.10. Initiate or continue reporting in accordance with reference (u), Combatant Command, Service, or DOE Directives.

C5.4.11. Establish or continue liaison with the FEMA's DFO (if the DFO is established), and local civil and law enforcement authorities.

C5.4.12. Integrate civilian authorities into C2 and response forces if the civilian community is affected. Provide necessary LNOs.

C5.4.13. Coordinate actions with any accident investigation board (AIB) or team. To the greatest extent possible, evidence necessary to ease the accident investigation shall be preserved. Weapons recovery and security operations shall consider the safety of the public and the response forces and, when possible, coordinate their actions with the Chairman of the AIB or team. In all cases, the safety and/or security of the accident site shall take precedence over accident investigation activities. The OSC shall work with the Chairman of the AIB to conduct its investigation while maintaining the safety and security of the accident site.

C5.4.14. Help the involved government (State or local) ensure the health and safety of civilians.

C5.4.15. Provide required medical, logistical, and administrative support, as needed, by follow-on Federal forces.

C5.4.16. If not previously accomplished, confirm the presence of nuclear weapons in accordance with reference (x).

Table C5.T1. Nuclear Weapon Confirmation Guidelines

Confirmation Guidelines for the OSC
It is DoD and DOE/NNSA policy to neither confirm nor deny the presence of nuclear weapons at any particular installation or location. There are two exceptions to this policy:
1. The OSC is required to confirm the presence of nuclear weapons or radioactive nuclear components in the interest of public safety if the public is, or may be, in danger of radiation exposure or other danger posed by the weapon. The Office of the ASD(PA) or the DOE/NNSA Office of Public Affairs shall be advised of this confirmation as soon as possible.
2. The OSC may confirm or deny the presence of nuclear weapons to reduce or prevent widespread public alarm. The Office of the ASD(PA) or the DOE/NNSA Office of Public Affairs shall be advised before or, as soon as possible, after such notification.

C5.4.17. Be responsible for planning, directing, coordinating, and administering the nominal response elements listed in section C5.5., below. Each nuclear weapons accident is unique and requires unique management of the responding forces. The OSC should modify his or her organizational and response tactics accordingly. Situational awareness and sound professional judgment apply at all times.

C5.4.18. Initiate planning activities and actions, where possible, that address SR. Appoint an OSC representative, knowledgeable in SR matters, as personal liaison to State and local authorities and the citizenry.

C5.5. OSC ESSENTIAL RESPONSE ELEMENTS

The OSC should include, at least the following response elements:

C5.5.1. Safety. The safety element shall operate the ASHG. The ASHG conducts hazard surveys and tends to radiological safety and health physics matters. The ASHG also advises the OSC on all radiological safety and/or health physics matters and recommends and implements precautionary measures for residents and other persons in potentially contaminated areas. See Chapter 10 for more detailed information on the ASHG's responsibilities and concept of operations.

C5.5.2. Medical. The Medical element assists in accident-related emergency medical treatment and in establishing health and safety programs to support response operations over an extended period of time. See Chapter 11 for more information on the medical element's responsibilities and concept of operations.

C5.5.3. Security. The security element plans and conducts security operations at the scene of a nuclear weapon accident. Tasks include advising the OSC on Operation Security (OPSEC) matters, establishing an NDA/NSA, establishing ECPs, guarding the NDA/NSA and associated ECPs, coordinating security actions with State and local officials, and advising and assisting the OSC on counterintelligence matters. See Chapter 12 for more detailed information on the security element's responsibilities and concept of operations.

C5.5.4. EOD. As the primary element responsible for weapon recovery, the EOD element shall conduct weapon damage assessments, initiate systematic searches to re-establish accountability of weapons and components, and stabilize the site from nuclear and conventional hazards. See Chapter 6 for more detailed information on the EOD element's responsibilities and concept of operations.

C5.5.5. Communications. The Communications element establishes timely external communications to higher HQ and ensures internal communications among the response force elements. See Chapter 13 for more detailed information on the Communications element's responsibilities and concept of operations.

C5.5.6. Public Affairs. The Public Affairs element establishes and operates the JIC and a Public Affairs program. Essential to the element's work is advising the OSC and staff members on media relations and public information, preparing the OSC and staff for news briefings, and preparing news releases. See Chapter 14 for more detailed information on the Public Affairs element's responsibilities and concept of operations.

C5.5.7. Legal. The Legal element advises the OSC and staff elements on any legal matters related to the response effort. The Legal element also preserves factual and evidentiary information, reviews operational plans to identify potential legal problems and to ensure that they are legally sufficient, and operates a Claims office. See Chapter 15 for more information about the Legal element's responsibilities and concept of operations.

C5.5.8. Logistics. The Logistics element provides rapid air and ground transport for delivering personnel, supplies, and equipment to the accident site. Additionally, the Logistics element provides messing and billeting facilities, an adequate water supply, and equipment maintenance support to the response forces. See Chapter 16 for more detailed information on the responsibilities and the concept of operations of the Logistics element.

C5.5.9. Protocol. The Protocol element supports any senior military or civil official visiting the accident scene.

C5.5.10. Financial. The Financial element tracks the expenditure of funds and requests for reimbursements. Under current DoD and DOE policy, the organization (the Military Service or the DOE/NNSA) having custody of the nuclear weapon or radiological materials during the accident is responsible for reimbursing, on request, the Combatant Command providing the RTF and, on request, other Federal Agencies with a direct or supporting role in the response effort.

C5.5.11. Contracting. Contracting support shall include, but not be limited to, local purchase agreements; long-term rental of facilities and equipment; and immediate procurement of communications, computers, and transportation services. To accomplish these actions, the Contracting element shall establish local service contracts to ease logistics support for the following services:

C5.5.11.1. POL.

C5.5.11.2. Water.

C5.5.11.3. Food.

C5.5.11.4. Sanitation.

C5.5.11.5. Maintenance.

C5.5.11.6. Laundry.

C5.5.11.7. Administration equipment.

C5.5.11.8. Specialized equipment and/or clothing items, as needed.

C5.5.11.9. Lodging.

C5.5.11.10. Considering purchase agreements for equipment and/or supplies that may not be returnable after recovery operations.

C5.5.11.11. Documenting all accident response and/or recovery-related costs.

C5.6. SRWG

C5.6.1. Overview. SR planning and actions may begin almost simultaneously with the arrival of the IRF or the first DOE/NNSA response forces on-site but the process is usually formalized after stabilizing the emergency situation. The OSC shall form, with representation from Federal, State, and local agencies, the SRWG, which shall:

C5.6.1.1. Analyze the type and extent of the contamination (see Chapter 10).

C5.6.1.2. Develop a plan to remediate the affected area.

C5.6.1.3. Receive Federal, State, and local government approval for the plan.

C5.6.1.4. Execute the plan.

C5.6.1.5. Monitor the results.

C5.6.2. Description of the SRWG. The SRWG shall expand and contract with changing conditions at the accident scene. As operations are completed, the SRWG may absorb some cells from other response organizations, or the OSC may decide to keep those elements separate and use the SRWG as a final coordination and approval group. Membership, size, and location of the SRWG are flexible and dynamic. Coordination and approval of the long-term plan may take an extended period of time and concentrated effort, requiring a substantial SRWG membership. Once the plan is agreed on, the SRWG's role should become that of monitor and

advisor. Members shall likely return to their normal responsibilities, meeting as necessary to address issues that arise in implementing the plan.

C5.6.3. SRWG Leadership. Leadership of the SRWG shall depend on several factors, such as time elapsed since the accident, scope of the remediation problem, location of remediation activity, and the desires of the State or host nation. Initially the SRWG shall be directed by the LFA but the State may exercise its authority over the contaminated area and assume SRWG leadership. The SRWG is discussed in detail in Chapter 7 of this Manual.

C6. CHAPTER 6

U.S. TERRITORY NUCLEAR WEAPON ACCIDENT RESPONSE PHASE IV: WEAPON RECOVERY OPERATIONS AND DISPOSITION

C6.1. OVERVIEW

Weapons recovery involves myriad technical disciplines and supporting infrastructure to effectively reduce hazards to the public and environment. Weapons recovery begins once fires, if any, have been extinguished, weapons have been cooled, exposed personnel have been removed or stabilized, and initial reconnaissance of the area has been conducted by nuclear certified EOD personnel to locate weapons and to prioritize future actions.

C6.1.1. EOD teams, supported by safety, security, logistics, and health physics personnel, shall develop an Initial RSP, to include entry and access controls to the accident scene, consistent with Joint Nuclear Weapons Publication System 60-6 and 60-1 Manuals (references (y) and (z)). The purpose of the Initial RSP is to stabilize the weapons and to reduce the likelihood of unintended nuclear detonation or further explosive or radiation hazards. EOD teams shall also render safe other HAZMATs that may be associated with the accident (i.e., flares, explosive charges, etc.) as they encounter them near the weapon(s) to ensure they have no adverse impact on the weapon(s) or EOD team safety.

C6.1.2. The EOD teams' next concern shall be to locate and identify disassociated weapons components for recovery. For this action military weapons technicians may be used to assist the principal EOD element. All EOD technicians have undergone basic nuclear weapons RSPs in EOD school and military weapons technicians, because of their hands-on training for maintenance, are knowledgeable of the components, their functions, and their identities. Therefore they are valuable resources available for weapons recovery. However, military weapons technicians are not nuclear weapons certified; therefore personnel do not need to be in the PRP to accomplish this task.

C6.1.3. Depending on the urgency of the recovery effort, the OSC and EOD personnel shall probably await the arrival of the DOE/NNSA ARG before conducting any further operations on the weapons. Once the ARG has arrived and assessed the condition of the weapons and components in coordination with EOD technicians, systematic recovery plans shall be developed for each functional task to be conducted on the nuclear weapon(s). Special plans shall also be developed for weapon(s) parts that contain SNM and explosives that may or may not be associated with the SNM. This includes packaging, handling, and transporting the weapons and associated components from the accident scene using safe, secure, and certified equipment.

C6.2. PURPOSE AND SCOPE

This Chapter provides information about weapon operations after a nuclear weapon accident. Requirements and planning are also discussed to develop operational plans for recovering nuclear weapons, weapon components, and other HAZMATs.

C6.3. SPECIFIC REQUIREMENTS

DoD military EOD personnel are tasked to perform all hands-on technical RSPs on damaged weapons regardless of which Government Agency is the LFA. However, the Agency that had custody of the weapons during the accident is responsible for weapons recovery operations. EOD shall be directly supported and advised by DOE/NNSA ARG scientific and technical personnel. During weapon recovery operations, personnel shall:

C6.3.1. Find the status and location of the weapon(s), including whether HE detonations occurred.

C6.3.2. Assess weapon(s) damage.

C6.3.3. Perform site stabilization, render safe, and continuation procedures on the weapon(s).

C6.3.4. Initiate a systematic search, using all available resources, until the location of the weapon(s) and all weapon components is known. A proven and prudent process is to mark each weapon, component, etc. on a chart using Global Positioning System (GPS) coordinates so follow-on teams may rapidly and efficiently find these items.

C6.3.5. Establish a staging area where weapons and components may be decontaminated and packaged. Be careful to assure that staging areas to be used for associated SNM and explosives and/or explosives components are sited consistent with ESQD criteria and standards, as outlined in reference (g). This action is to protect workforce, personnel, and high value assets, and to reduce the likelihood that a mishap shall further impact other weapons and components.

C6.3.6. Perform necessary actions for transporting or shipping the weapon(s) and components for interim storage and/or final disposition.

C6.4. RESOURCES

The OSC may request many types of support during the accident response operation. The principal resources available to meet weapon recovery responsibilities are EOD teams and the DOE/NNSA ARG.

C6.4.1. EOD. Military EOD personnel are responsible for the actual performance, supervision, and control of hands-on weapon recovery operations. The following guidelines apply to using EOD teams:

C6.4.1.1. When the Department of Defense is the LFA, the Combatant Commander having primary responsibility for C2 on-site at the accident provides, or gets from the owning service, EOD teams to perform required procedures on the weapon(s). When the DOE/NNSA is the LFA, the OSC should request EOD teams from the Combatant Commander providing response forces for the Department of Defense.

C6.4.1.2. Any active duty service or Combatant Command EOD teams may provide emergency support until the designated EOD team arrives. Emergency support is limited to initial weapon assessment, emergency RSP, and site stabilization.

C6.4.1.3. U.S. Navy EOD teams recover weapons located underwater because only U.S. Navy EOD personnel are trained in these diving techniques.

C6.4.1.4. EOD personnel, officers and enlisted, are graduates of the Naval School, Explosive Ordnance Disposal, at Eglin AFB, FL, formally Indian Head, MD. Nuclear certified technicians who are assigned duties consistent within the PRP are the only personnel qualified to perform RSP on nuclear weapons. Non-nuclear certified EOD personnel who are not assigned to duties within the PRP may conduct RSP on explosive components and other HAZMATs that do not contain associated explosives and SNM. If SNM is not associated with the explosives, non-nuclear personnel may perform RSP on the explosives. EOD personnel, PRP and non-PRP, are trained to detect, identify, and contain explosive, radiological, and other hazards associated with nuclear weapons. Optimal use of team integrity should reduce the risk of security, two-person rule, and PRP violations. Once EOD personnel have identified and contained these hazards, the location should be marked using GPS coordinates and submitted to the JOC, the ASHG, and other appropriate elements.

C6.4.1.5. The EOD team provided, or obtained, by the Service having primary C2 responsibility shall safe the weapon(s). If an extremely hazardous situation exists, the initial responding EOD team with the equipment and capabilities to safe the weapon should do so.

C6.4.1.6. The organization of EOD teams varies among Services as does the number and seniority of personnel assigned; however, all teams have the same basic capabilities and are trained in radiological control (RADCON) and monitoring techniques applicable to their operations. They have the necessary communications and personal safety equipment to operate in an accident environment. Moreover, teams have a background in weapon design information enhanced by coordination with DOE/NNSA scientific advisors on arrival at the accident scene. While tasks assigned to EOD personnel are clearly in the realm of weapon safing and disposal, they must operate within the framework of the overall response group and conduct operations only as directed by the OSC.

C6.4.1.7. The EOD team's actions, by priority are:

C6.4.1.7.1. Preventing nuclear detonation.

C6.4.1.7.2. Preventing nuclear contribution or an HE detonation.

C6.4.1.7.3. Detecting, identifying, containing, and reducing the hazards of explosives and external and internal radiation hazards resulting from the accident until work plans have been developed and the level to which decontamination must be conducted has been established.

C6.4.1.7.4. Protecting EOD personnel against the hazards noted in subparagraphs C6.4.1.7.1. through C6.4.1.7.3., above.

C6.4.2. DOE/NNSA ARG. The DOE/NNSA ARG includes weapon design personnel and explosive experts with weapons and associated hazards expertise. The ARG provides technical advice and assistance in collecting, identifying, decontaminating, packaging, and disposing of weapon components, weapon debris, and resulting radioactive materials; and technical advice and assistance to EOD teams in RSP and recovery procedures. Each nuclear weapon has RSPs developed, evaluated, coordinated, and authenticated in references (y) and (z). Because weapons may have been subjected to extreme stress during an accident, the DOE/NNSA's unique equipment to assess the applicability of these procedures and/or the development of new procedures should be considered.

C6.4.2.1. DOE/NNSA radiographic capabilities are available for field diagnostics of damaged weapons in the event of an accident. The Los Alamos National Laboratory has fieldable radiographic units with accompanying film, film processing, and viewing equipment.

C6.4.2.2. DOE/NNSA aerial radiological surveys by the AMS help find weapons and weapon components. This capability is addressed in Appendix 7.

C6.4.2.3. The DOE/NNSA maintains the expertise to safely package damaged nuclear weapon(s) and weapon debris associated with an accident involving nuclear weapons. The DOE/NNSA is prepared to provide accident response containers that are designed to safely transport damaged nuclear weapons, their components, and/or debris. These containers have been shown to provide an acceptable level of control of the radiation, criticality, and thermal hazards to persons, property, and the environment that are associated with transporting radioactive material.

C6.4.2.4. Additional information on the ARG, DOE/NNSA radiographic capabilities, the AMS, and other DOE/NNSA capabilities may be obtained from the DOE/NNSA HQ or the DOE/NNSA Albuquerque Operations Office.

C6.5. CONCEPT OF OPERATIONS

Weapon recovery begins with the initial reconnaissance, proceeds through the conduct of RSPs, and ends with disposal of the weapons and components. These operations are discussed in this concept of operations. The two-person concept must be strictly enforced when working with nuclear weapons and/or SNM. In the early stages of accident response, personnel may find it difficult to follow all of the required security measures; however, the OSC should implement necessary security procedures as soon as possible.

C6.5.1. Initial Entry. The initial entry shall determine the preliminary weapon(s) status and hazards in the area. During the initial entry, weapons and aircraft, vehicle, ship (submarine), or missile wreckage present several hazards. Nuclear weapons and some components contain conventional explosives and other HAZMATs. Nuclear material may have been dispersed on impact, during detonation of explosives, or by combustion in a fire. Weapons may need stabilizing to prevent further damage or explosions. Other explosive items that may be encountered include conventional munitions, aircraft fire extinguisher cartridges, engine starter cartridges, pyrotechnics, and egress or extraction devices. Leaking fluids, liquid oxygen, propellants, oxidizers, shredded or torn metals, and composite materials and/or fibers present additional hazards. Initial responders mark these hazards and a clear pathway and/or entryway to the weapon(s). IRF EOD teams determine weapons condition, perform initial site stabilization, and perform emergency RSPs, as required by the situation. If a release of radiation is detected, the procedures in Chapter 10 should be used.

C6.5.2. RSPs. The OSC is ultimately responsible for the proper implementation of any RSPs. The EOD team evaluates and analyzes the accident situation and advises the OSC of the safest and most reliable means for neutralizing weapon-associated hazards. RSPs may begin, if required, once the reconnaissance has been completed. In an accident, nuclear materials must be handled according to written procedures. If the weapon is in a stable environment, no immediate actions should occur until a coordinated weapon recovery plan has been developed by EOD personnel and the DOE/NNSA ARG Weapon Recovery Team. These plans must be approved by the OSC with the supporting agency’s team leader, the senior member of the EOD team, and the ARG Weapons Recovery Director. Consider the following when deciding a course of action:

C6.5.2.1. Explosive ordnance and accident debris are inherently dangerous, but some minimum number of personnel may have to be exposed to hazards to complete the mission.

C6.5.2.2. Consequences should be evaluated before exposing personnel to hazards.

C6.5.2.3. When available, DOE/NNSA radiographic equipment is used to assess internal damage and aid standard EOD procedures. ARG capabilities and knowledge, combined with EOD team procedures and experience in RSPs under hazardous conditions, provide the best method of determining a weapon’s condition before it is moved.

C6.5.2.4. Staging; decontamination; packaging; and the method, type, and final disposition of the shipment should be an integral part of the RSP planning phase.

C6.5.2.5. The high priority given to weapon recovery operations does not inherently imply a need for rapid action. Personnel and public safety must never be sacrificed solely for speed.

C6.5.2.6. RSPs developed by the EOD and the DOE/NNSA ARG shall be reviewed and approved by the joint DoD/DOE/NNSA Weapons Recovery Safety Evaluation Team, an independent safety review team, before presentation to the OSC.

C6.5.3. Nuclear Weapon Security. The two-person concept must be enforced strictly when working with nuclear weapons. The OSC should ensure that all personnel are familiar with the concept and that it is strictly enforced. Physical security safeguards required to prevent unauthorized access to classified information and proper control and disposition of classified material must be strictly enforced during all operations involving the weapon(s) or weapon components. Because of the technical information requirements during nuclear weapon operations, some documents at the accident scene may contain CNWDI. The sensitive information in these documents requires that security measures be implemented consistent with the highest classification assigned. Personnel working in an area containing CNWDI should be properly cleared and authorized until recovery discussions are complete and the items have been covered or removed.

C6.5.4. Search Techniques. All weapons and components MUST BE FOUND. Depending on the accident circumstances, weapons and weapon components may be scattered and/or buried over a large area. A systematic search may be required over this large area until accountability for all the weapons and weapon components is reestablished. The search may become a time-consuming operation requiring many personnel. The search method used by the OSC depends on many factors including the number of personnel available, topography, and environmental conditions. Metal detectors and RADIAC equipment may be needed to find all weapons and components. As components are found, their location should be marked, recorded on a map, and photographed. The items should be removed to a storage area after coordination with accident investigators, safety and security permitting. If all components are not found, the EOD team leader should coordinate with the ARG Weapon Recovery Team and recommend to the OSC additional search procedures that may be attempted, and at what point the search for components shall stop. Search techniques that may be used are:

C6.5.4.1. Course Search. A search in loose crisscrossing patterns designed to find weapon components rapidly. This technique is used by EOD and radiological monitoring personnel to search the accident area soon after the accident has occurred.

C6.5.4.2. Aerial Radiological and Photographic Survey. This technique is used to identify areas of significant radioactive intensity to help find missing weapon components and provide high resolution photography.

C6.5.4.3. Instrument Search. Metal and radiation detectors monitor those areas where weapons or components were found before. This method may supplement the visual search.

C6.5.4.4. Visual Search. A search usually conducted by a slow moving line of personnel positioned abreast at various intervals depending on the object to be located.

C6.5.4.5. Scarifying Procedure. Components may have been buried during the accident or subsequently covered by wind action. A road grader equipped with scarifiers (large steel teeth) is used to plow a surface. Search teams then follow the graders and conduct a visual and/or instrument search for missing components. This system has proven successful in past search operations. Coordination must be made with the ASHG before implementing techniques

to assess personnel protection requirements due to resuspension and the potential impact on site decontamination and restoration.

C6.5.5. Recovery

C6.5.5.1 Hazard Removal. Another major step in weapon recovery begins with the removal of identified hazards. The OSC establishes priorities for removing all hazards so that other response personnel may conduct operations. It is unsafe for anyone but task-trained personnel under EOD supervision to clear an area of broken, scattered, or resolidified HE.

C6.5.5.2 Disposal. After the weapons are evaluated by EOD personnel and the DOE/NNSA as safe for movement, weapons are moved to a designated weapon storage area, in coordination with accident investigations.

C6.5.5.2.1 On-site disposal of HE depends on available space and hazards presented, including resuspension of contaminants. Storage area or disposal sites should be large enough to reduce hazards to personnel in the event of a detonation. The distances that storage areas are separated from other operations are determined by the type and amount of explosives stored. An isolated and segregated area should be set aside for the exclusive storage of exposed or damaged explosives.

C6.5.5.2.2. If open storage is used, weapons and weapon components must be protected from the elements and information sensors, including satellite surveillance.

C6.5.5.3. Storage of Explosives. If explosive items may not be stored separately, a balance of safety and practical considerations requires assigning each item to a storage group based on compatibility characteristics.

C6.5.6. Custody. Each Service has publications that address the storage, security, and safety aspects associated with nuclear weapons. These publications also address requirements for the custody of nuclear weapons and weapon components. Moreover, performance of EOD procedures does not, in itself, constitute transfer of custody to the EOD team. Final disposition of damaged weapon(s) and/or components involves returning these devices to the DOE/NNSA; therefore, close coordination between the OSC and the DOE/NNSA SEO is necessary throughout the weapon recovery phase. Custody of the damaged weapon(s) and components is transferred to the DOE/NNSA at a point decided jointly by the Department of Defense and the DOE/NNSA.

C6.5.7. Packaging and Marking. Transportation specialist consultation is required for weapon(s), weapon components, and/or explosives damaged or subjected to extreme forces during accidents. Before weapon(s), weapon components, and/or explosives are shipped, they must be packaged to ensure that no contamination breaches the container and that the environment experienced during shipment shall not cause further damage or explosions. To ensure this requirement, special packing, shipping, marking, and safety instructions must be obtained to comply with transportation regulations from the Department of Defense, the DOE/NNSA, and the Department of Transportation (DOT).

C6.5.8. Shipment. When the disposition decision has been made, the Department of Defense or the DOE/NNSA may be assigned the primary responsibility for moving the weapons. Nuclear weapons shall be moved by the safest means and over the safest routes. Movement should be kept to a minimum. Shipments of weapons and/or weapon components shall be routed to a DOE/NNSA facility for examination, analysis, and final disposition. Security of the shipment should be considered when deciding the mode and route of transportation.

C7. CHAPTER 7

U.S. TERRITORY NUCLEAR WEAPON ACCIDENT RESPONSE PHASE V: SR

C7.1. INTRODUCTION

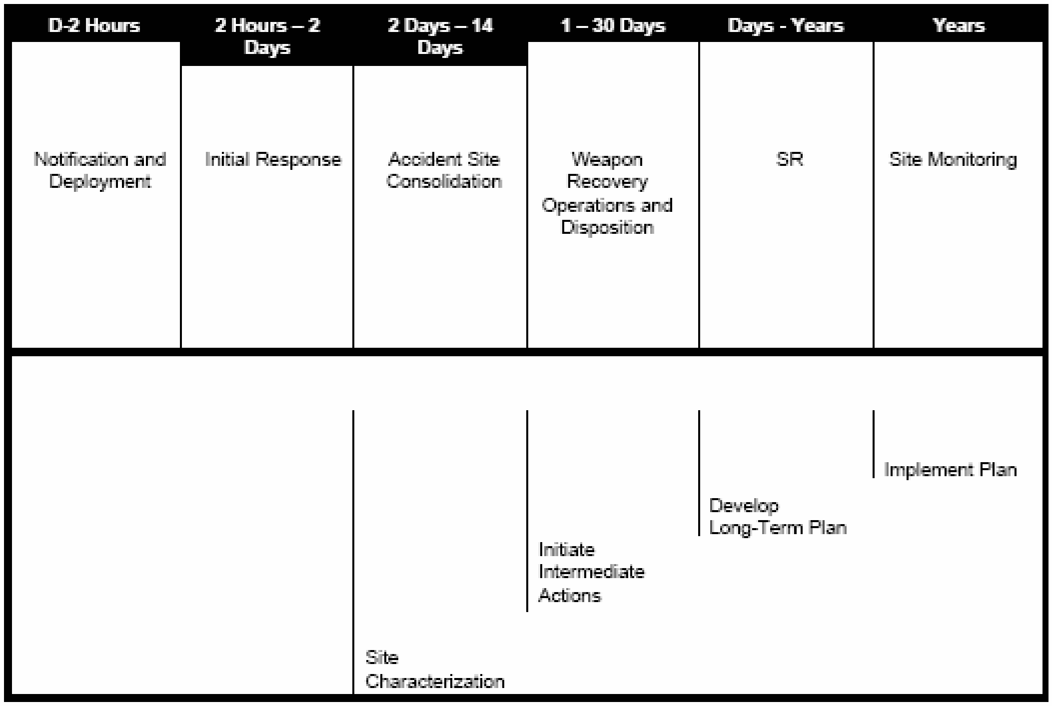
SR is the phase of the radiological accident response that primarily deals with remediation of the affected area. SR is closely integrated with other phases of accident response (see figure C7.F1., below). Many of the response teams that arrive early on to support the emergency response and recovery phases shall stay at the accident site in some capacity to support SR. Remediation actions at the site usually begin when planning activities begin during the Accident Site Consolidation Phase. SR activities may last for years after the radiological material is recovered. Personnel responsible for SR activities may refer to the Multi-Agency Radiation Survey and Site Investigation Manual[20] (reference (aa)), which was developed jointly by the Department of Defense, the DOE/NNSA, the EPA, and the NRC, to assist in this phase of the response.

C7.2. THE SR PROCESS

SR may be viewed as having five steps: planning (not shown in figure C7.F1.), site characterization, conducting intermediate actions, developing a long-term plan, and implementing the plan. Figure C7.F1., below, illustrates these steps within the phases of nuclear weapon accident response. In actuality, the SR process is ongoing. Many actions overlap from one step to the next as response forces address the difficult problem of remediating contaminated land, buildings, and property to agreed-on safe levels. By understanding the key actions required in each step, primary response organizations may refine their plans and organizational structures to meet the demanding tasks of SR.

[20] The Multi-Agency Radiation Survey and Site Investigation Manual may be obtained on the EPA's web site at http://www.eap.gov/radiation/marssim.

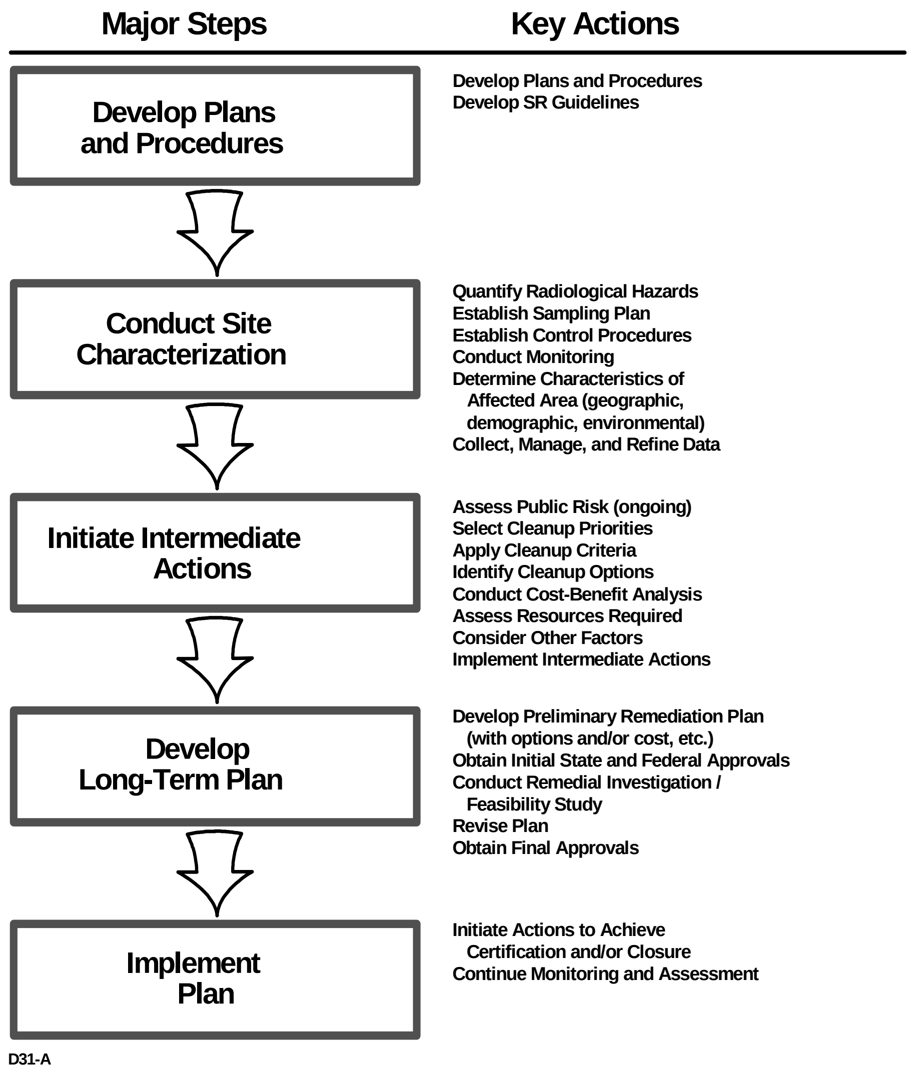
Figure C7.F1. SR Activities and the Phases of a Nuclear Weapon Accident Response



C7.2.1. Develop Plans and Procedures. The overall purpose of this Chapter is to help the OSC and supporting organizations develop and refine SR plans and procedures. The five-step process described in figure C7.F2., below, was developed by SR experts in an attempt to identify key actions that must be accomplished during the SR effort.

C7.2.2. Conduct Site Characterization. The key actions identified in this step are highly technical in nature, but a comprehensive and complete characterization of the problem is necessary to an effective SR effort. Current Service and DOE/NNSA guidance addresses this step in detail.

Figure C7.F2. The SR Process



C7.2.3. Initiate Intermediate Actions. Planners must recognize that some SR actions shall begin very soon after the accident, before the full SR effort has begun. Events in this step may take days or weeks to complete and have a significant impact on the final SR plan. During this step, the SRWG is formally established.

C7.2.4. Develop Long-Term Plan. Once the radiological material and classified components have been removed from the accident site, developing the SR plan becomes the primary goal of the OSC and other supporting organizations responding to the accident. This step shall involve extensive coordination and approval at all levels before a final plan evolves. While a budget should be developed, the cost of remediation should not be the driving factor in developing a plan. Realize that a long-term plan may take months, or perhaps years, to complete.

C7.2.5. Implement Plan. Once all plans have been approved, various elements shall implement the plan, monitored by an LFA representative and the State and local governments. Members of the SRWG continue to advise and assist the LFA and the State during this period.

C7.3. ROLE OF THE OSC

C7.3.1. Once at the accident scene, the OSC faces the challenge of integrating forces from diverse Federal and Service accident response organizations to recover the radiological material, ensure the safety of all personnel in the area, and remove the material and all classified components as quickly and safely as possible. At the same time, the OSC must work closely with Federal, State, and local officials to ensure public health and safety issues are adequately addressed. At times, these priorities may appear to be in conflict, but public health and safety concerns are always paramount. Recognizing the role of State and local authorities and the importance of public involvement throughout the SR process is vital to a successful SR effort.

C7.3.2. The State or local governments have the primary responsibility for planning the recovery of the affected area. Recovery planning shall be initiated at the request of the State. The Federal Government shall, on request, help the State and local governments develop off-site recovery plans before the deactivation of the Federal response.

C7.3.3. Regardless of where the accident occurs, the OSC plays a key role in ensuring that the Federal Government fulfills its responsibilities in accident site recovery and cleanup. This role varies somewhat depending on the location of the accident. The OSC always maintains primary responsibility for recovering and removing material and classified components. Once accomplished, the focus is on the SRWG in developing an SR plan. If the accident occurs on a military installation or on Federal property, the OSC leads SR activities and cleanup with a major responsibility for coordination with other Federal, State, and local authorities. If the accident occurs off an installation or Federal property with the Department of Defense in possession, then the Department of Defense assumes the role of the LFA. In this case, the OSC keeps a major role in developing the SR plan by the SRWG and in supporting State and local authorities that direct the SR effort.

C7.3.4. Coordination with all supporting organizations is critical. Support from other Federal Agencies responding to the accident is coordinated through the DFO, chaired by the FEMA. In addition, the State shall probably deploy a forward element of its emergency management division to the accident site. This organization, which usually works directly for the Governor, shall lead remediation of affected State property. Coordination with local jurisdictions that may be affected is essential throughout the process.

C7.3.5. The OSC's role in directing and coordinating SR activities changes as the activities at the accident scene progress from initial recovery operations to intermediate and long-term activities. The remainder of this chapter discusses more fully the role of the OSC, responding organizations represented in the SRWG, and the overall SR process.

C7.4. SRWG

In the area of SR, the challenge for the OSC is to form a cohesive and effective organization at the accident scene that may address the wide variety of SR issues in support of State and local governments. The expertise to accomplish this task comes from separate and distinct organizations that respond to the accident. The OSC must integrate Federal, State, and local resources to get a technically and fiscally achievable remediation level that is within socially and politically acceptable guidelines. The primary organization for coordinating Federal resources is the SRWG.

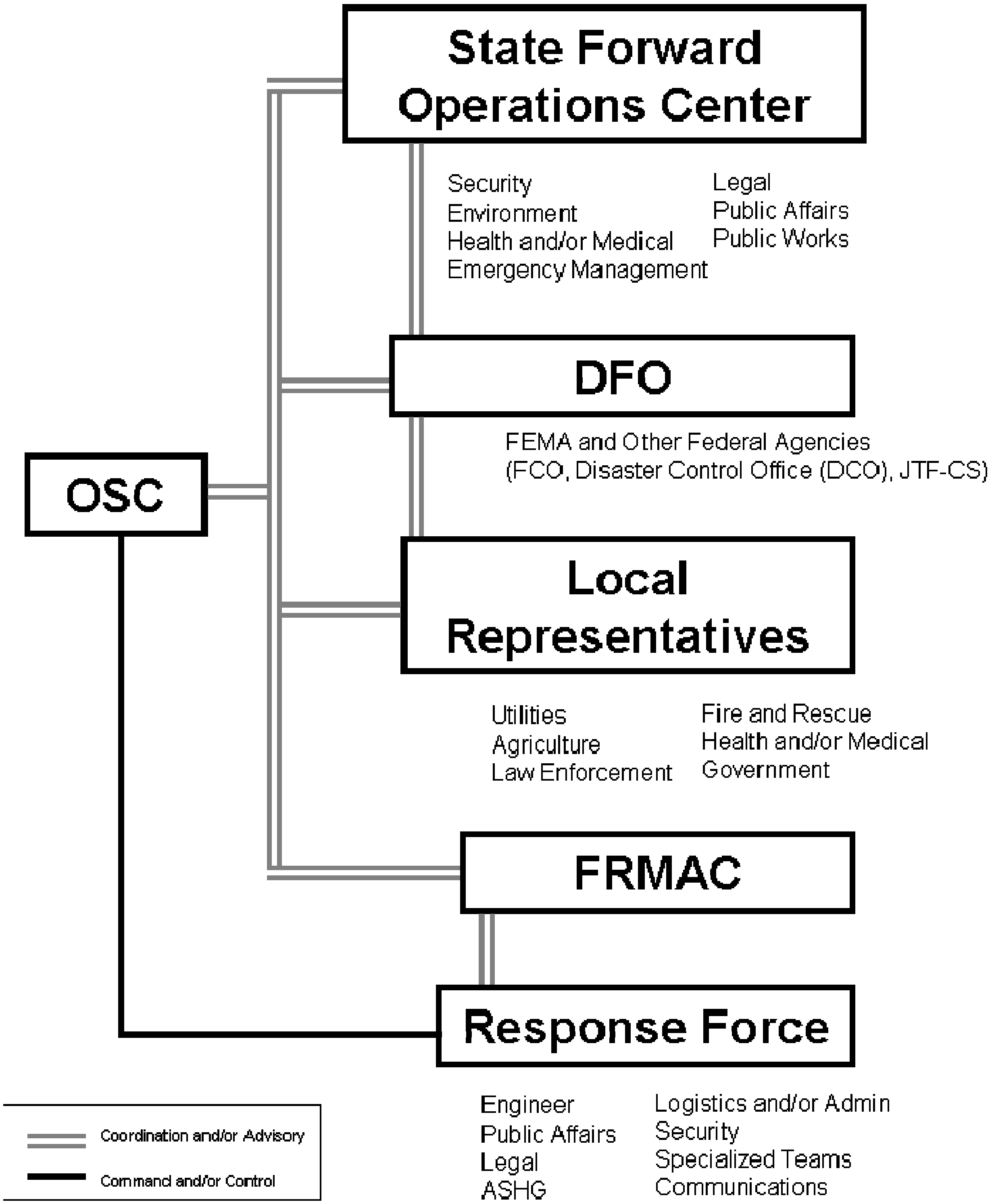
C7.4.1. The SRWG is an organization formed at the accident scene with the sole purpose of focusing on SR issues. The SRWG draws on the expertise of the various elements that respond to the accident to form a coordinated SR team. Membership in the SRWG shall vary, depending on the extent of contamination at the accident scene. SRWG members should have the requisite qualifications and level of authority to plan and coordinate SR activities for their organizations.

C7.4.2. The timing for forming the SRWG is unique to the specific conditions of the accident. Most of the Agencies, organizations, and groups that eventually have representation on the SRWG are present from the early stages of accident response. An informal SRWG might form even as weapon recovery operations are ongoing; however, the expectation is that the SRWG, as a formal, authoritative, and responsible organization, shall be convened after weapons are removed and classified components and documents are recovered, but before the Federal response is deactivated. The SRWG shall stay active after Federal response deactivation, if continued support to State and local governments is requested.

C7.5. EARLY SR EFFORTS

Early efforts addressing SR are likely to be less formal as the OSC concentrates on recovering and removing the nuclear weapons. At this stage, small numbers of people are working separately on issues related to SR. Elements of the SRWG exist in an informal relationship that the OSC coordinates. Figure C7.F3., below, shows this relationship. During this stage, the OSC is responsible for coordination and communication among key SR elements.

Figure C7.F3. SR: Early Stages



C7.5.1. The separate elements shown in figure C7.F3., above, shall begin the process of SR. Some preliminary planning within the ASHG is possible as contamination and damage information becomes available. The ASHG is the OSC's single control point for all on-site

hazard and/or radiological data and has access to off-site information through coordination with the FRMAC.

C7.5.2. The FRMAC conducts off-site response to a radiological accident as directed by the DOE/NNSA during the emergency phase, with later transfer to the appropriate lead agent for intermediate and long-term actions. It provides information and support to the State and the OSC as well as the ASHG in developing the SR plan. The Director of the FRMAC shall assign a representative to the SRWG.

C7.5.3. The FEMA, in accordance with reference (e), forms the DFO to coordinate Federal, State, and local agencies' assistance to the OSC for off-site accident response functions other than radiological monitoring and assessment. It shall continue operations into the remediation phase. The FCO, Director of the DFO, has a major coordinating function as the OSC's official liaison with State and local representatives at the site.

C7.5.4. The State shall establish a forward operations center at the accident scene to maintain close coordination with the OSC and the Governor's office. State and local representatives shall also take part in the DFO and the FRMAC. State and local representatives must be included in the early stages of SR planning and throughout development and implementation of the long-term plan.

C7.6. SR AND THE SRWG

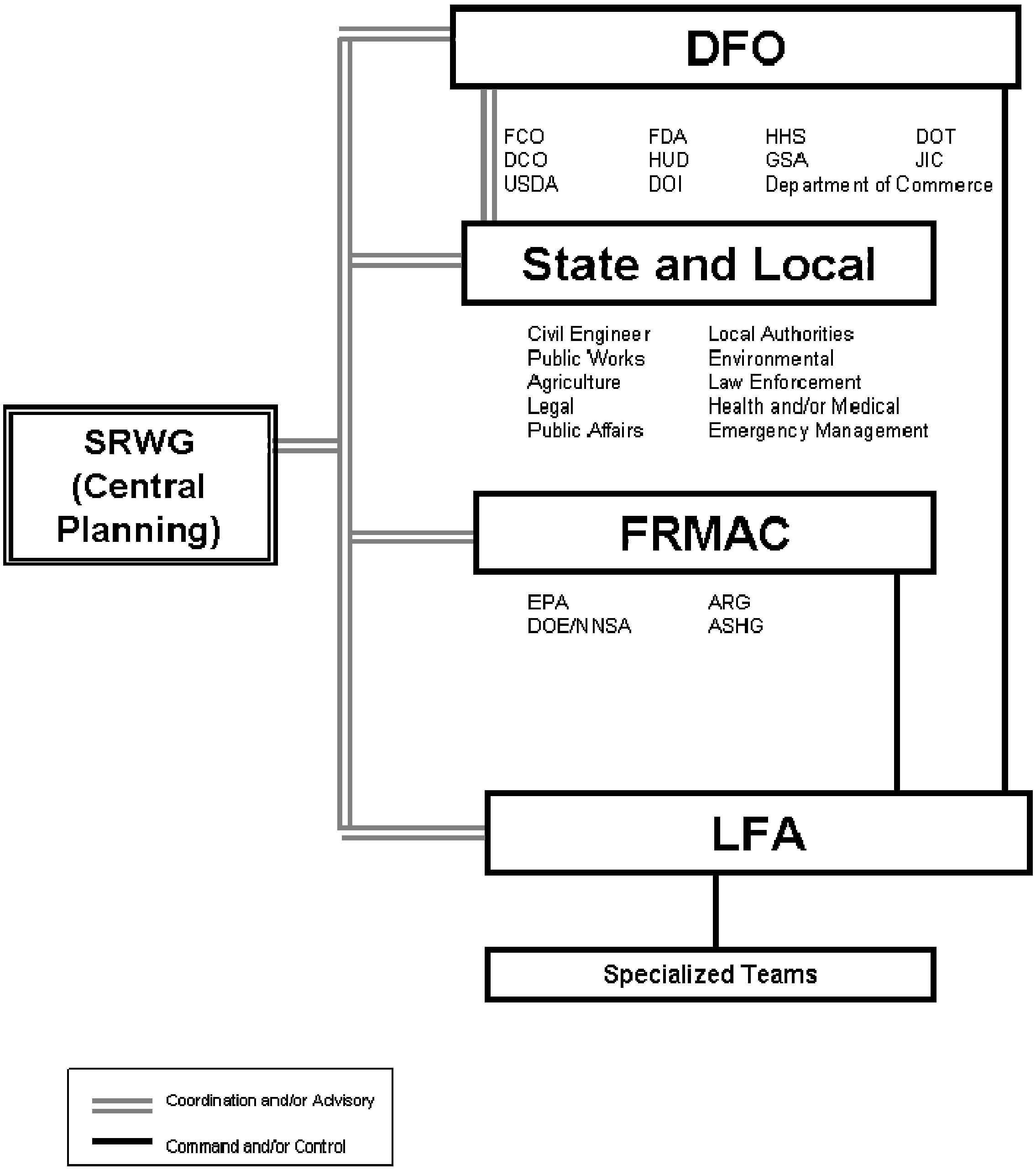
As weapon recovery operations wind down, the focus of activity shifts to SR. Using guidance from Federal, State, and local authorities, the SRWG becomes the central planning agent for SR. In accomplishing this, the SRWG shall constantly reach out to organizations at the accident site (see figure C7.F4., below) and those in a position of authority to gather information, make decisions, and affect SR activities.

C7.6.1. The SRWG is expected to be a dynamic organization with a varied composition. Leadership shall depend on many factors, such as time elapsed since the accident, scope of the remediation problem, location of remediation activity, and the desires of the State. The LFA or the State may direct the SRWG. Figure C7.F4., below, shows how the SRWG interacts with other elements in the SR process. While the SRWG includes important representation by State and local interests, assistance and advice from several Federal Agencies, coordinated through the DFO and the FRMAC, may be needed to solve specialized problems, such as those in table C7.T1., below.

Table C7.T1. Federal Agencies With Specialized SR Responsibilities

U.S. Department of Agriculture (USDA)	-	Crop damage
Department of the Interior (DOI)	-	Federal lands
Department of Commerce	-	Industrial damage
DOT	-	Highway, railway closures
Housing and Urban Development (HUD)	-	Housing assistance
HHS	-	Medical services
Food and Drug Administration (FDA)	-	Food contamination
CDC	-	Public health concerns
General Services Administration (GSA)	-	Contracting assistance
Corps of Engineers	-	Water supply
EPA	-	Non-radiological impact
AFRRI	-	Cleanup cost estimates

Figure C7.F4. Remediation Phase Relationships

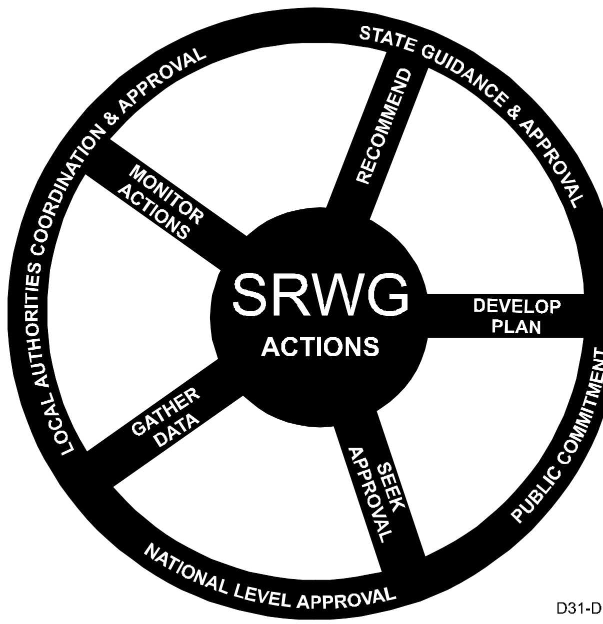


C7.6.2. The SRWG should apply a similar coordination process to take full advantage of State and local assets, as well as additional DoD and DOE/NNSA resources, that may be available.

C7.6.3. Using this coordinated approach, the SRWG's role is to make recommendations, monitor implementation of approved intermediate actions and their impact on long-term recovery, and begin long-term SR planning. During the SR phase of accident response, the SRWG shall coordinate with a variety of sources both at the accident site and at other locations.

Members have the responsibility to coordinate long-term remediation plans at higher levels but should have the expertise necessary to advise accident site authorities on immediate remediation actions. Figure C7.F5., below shows the complicated process of drafting, approving, and implementing an SR plan using the SRWG as the central planning organization. Representing the interests of the Federal, State, and local governments and the public, SRWG members must have the authority to make some independent decisions when time does not allow coordination and approval at higher levels. This is especially true where intermediate actions are concerned.

Figure C7.F5. SRWG Approval and Coordination Process



C7.7. EVOLUTION OF THE SRWG

The SRWG shall expand and contract with changing conditions at the accident scene. As recovery operations are completed, the SRWG may absorb some cells from other response organizations, or the SRWG Director may decide to keep those elements separate and use the SRWG as a final coordination and approval group. Membership, size, and location of the SRWG are flexible and dynamic. Coordination and approval of the long-term plan may take an extended period of time and concentrated effort, requiring a substantial SRWG membership. Once the plan is agreed on, the SRWG's role should become that of monitor and advisor. Members are likely to return to their normal responsibilities, meeting as necessary to address issues that arise in implementing the plan.

C7.8. INTERMEDIATE ACTION

The third step in the SR process is to initiate intermediate actions. Intermediate actions are those steps taken to protect public health and environment, restore essential services, and develop the basis for a long-term plan. Some intermediate actions shall occur very early in the accident response, before the SRWG is formed. The OSC should consider these factors:

C7.8.1. Intermediate actions shall impact future SR decisions.

C7.8.2. There is a need for visible and immediate SR actions that shall require rapid Federal and State approval.

C7.8.3. Remediation decisions at this early stage shall be influenced by political and social factors as well as technical goals and limitations.

C7.8.4. While authority for remediation decisions might rest with the State and/or local representatives, responsibility for remediation costs and damages is expected to stay with the LFA.

C7.8.5. Priorities of Federal, State, and local authorities and special interest groups may differ.

C7.8.6. Intermediate actions shall vary depending on the circumstances surrounding the accident.

C7.8.7. The OSC must weigh each of the factors mentioned in paragraphs C7.8.1. through C7.8.6., in coordination with other Federal, State, and local authorities, in deciding which intermediate actions to take.

C7.9. IMPORTANCE OF INTERMEDIATE ACTIONS

Perhaps the most important objective of intermediate actions is to show to the community and public officials that steps are being taken to restore the pre-accident quality of life as soon as possible; however, this should only be done within the boundaries of public health and safety.

C7.9.1. Initially, SR planners should develop a process or structure which, to the extent possible, allows the eventual return to normalcy for the affected area. Including the public in developing this process allows them to have their questions answered and gains public confidence in the SR plan that shall emerge.

C7.9.2. Intermediate actions should concentrate on those problems that are most important or those that may be resolved quickly and easily. For example:

C7.9.2.1. Reopen transportation arteries that may have been closed (i.e., highways, bridges, railways, and airports).

C7.9.2.2. Reduce health and safety threats. Try to certify any affected water and food sources as safe from contamination; otherwise, ensure the rapid and plentiful supply of food and water from alternate sources.

C7.9.2.3. Identify remediation means and materials that are already present among Federal, State, local, and private and/or commercial resources. Knowledge of what is available may reduce response time and cost.

C7.9.2.4. Address the short-term economic impact on the area and people. Confer with the FEMA as to relief alternatives available, such as disaster declaration or Federal assistance from other sources that may provide immediate assistance.

C7.9.3. Effective intermediate actions such as those mentioned in subparagraphs C7.9.2.1. through C7.9.2.4., when properly coordinated and communicated to the public, may be instrumental in building public trust and confidence in the remediation effort.

C7.10. <u>INTERMEDIATE ACTION PLANNING</u>

The typical intermediate actions identified in this section are not meant to be exhaustive. They are identified as areas of emphasis all planners should consider in developing organizational SR plans.

C7.10.1. Protecting public health and safety is the most important consideration. Earlier steps taken by accident response forces should be reviewed for adequacy and applicability for the present and future, including:

C7.10.1.1. Public service announcements (PSAs) on television and radio explaining what is happening, how to find shelter or protection, and/or what type of materials or equipment to use to reduce the risk of exposure.

C7.10.1.2. Control of transportation arteries in the affected area.

C7.10.1.3. Application of appropriate fixatives.

C7.10.1.4. Testing water sources for contamination.

C7.10.1.5. Testing air, soil, and crops for contamination.

C7.10.1.6. Controlled evacuation of affected population.

C7.10.1.7. Controlled access to contaminated areas.

C7.10.1.8. Certification of contamination-free areas and resources.

C7.10.2. As long as contamination exists, there is a possibility that people may receive an uptake of radioactive material or an external radiation exposure. Limited decontamination may have been accomplished as SR is initiated. As a result, protective action should be taken to reduce radioactive material uptake through ingestive pathway methods. Some that should be considered are:

C7.10.2.1. Develop PSAs on proper handling of food, both fresh and packaged.

C7.10.2.2. Monitor food and water sources.

C7.10.2.3. Embargo foods from contaminated lands and water sources.

C7.10.2.4. Seek alternate food sources.

C7.10.2.5. Establish examining stations for follow-up monitoring.

C7.10.2.6. Establish a bioassay program.

C7.10.2.7. Implement an inspection program for restaurants along with food production and handling businesses.

C7.10.3. Feared or actual radiation damage to the environment shall no doubt dominate public, political, and media discussions, second only to concerns for public health and safety. SR managers must be prepared to show that the actions being taken are necessary and environmentally sound. Plans should consider:

C7.10.3.1. Testing soil for contamination.

C7.10.3.2. Applying fixatives, as appropriate.

C7.10.3.3. Conducting air sampling.

C7.10.3.4. Analyzing contamination level of rivers, lakes, and streams.

C7.10.3.5. Reducing threat to fish and wildlife by removing contamination from their respective habitats.

C7.10.3.6. Identifying temporary and safe storage areas for waste.

C7.10.4. Among the earliest questions are those concerning a return to normalcy. Remediation of services should be a priority for SR planners. The plan should consider actions necessary to restore:

C7.10.4.1. Water supply.

C7.10.4.2. Electricity.

C7.10.4.3. Transportation Systems.

C7.10.4.4. Heating fuels.

C7.10.4.5. Gasoline and/or Diesel.

C7.10.4.6. Refuse pickup.

C7.10.4.7. Mail delivery.

C7.10.4.8. Sewage treatment.

C7.10.4.9. Sanitation.

C7.10.4.10. Health care.

C7.10.5. The largest and most complicated challenge, after weapon recovery, is containing contamination. There are many avenues by which contamination may be spread. Consider the following:

C7.10.5.1. Limiting ground and air access.

C7.10.5.2. Creating a PSA to stay inside when or if threat exists.

C7.10.5.3. Applying fixatives.

C7.10.5.4. Restricting water distribution.

C7.10.5.5. Monitoring bird and animal movement.

C7.10.6. Re-entry to contaminated areas by residents to care for pets, get essential items, or secure property may be possible on a limited basis. Carefully consider the potential difficulties that may arise. The OSC should:

C7.10.6.1. Determine circumstances under which residents may return temporarily.

C7.10.6.2. Verify that contamination levels are not hazardous.

C7.10.6.3. Evaluate the impact of not allowing access to residents.

C7.10.6.4. Maintain adequate security.

C7.10.6.5. Limit exposure time.

C7.10.6.6. Have adequate decontamination facilities.

C7.10.6.7. Provide proper protective clothing for limited entry, when required.

C7.10.6.8. Allow only a manageable number of people into the area.

C7.10.6.9. Caution residents against disturbing the area.

C7.10.7. Consider the public impact of early SR actions. This may be the beginning of a protracted period of inconveniences that shall be imposed on the population. Carefully evaluate planned actions and:

C7.10.7.1. Keep the public informed; dispel rumors and inaccuracies immediately.

C7.10.7.2. Involve public officials and residents in planning.

C7.10.7.3. Explain hazards and how to avoid them.

C7.10.7.4. Provide health and medical services for affected individuals.

C7.10.7.5. Control the number of visible response personnel, if operationally possible.

C7.10.8. Realize that, in a highly visible operation like SR, political oversight is to be expected. Always include political considerations in decision-making. Strongly recommend:

C7.10.8.1. Establishing a political liaison office.

C7.10.8.2. Inviting representatives of Federal, State, and local political officials to take part or observe, when operationally possible.

C7.10.8.3. Seeking input from public interest and environmental groups.

C7.10.9. Cost benefit considerations should be a factor, although perhaps minor, in any operation as expensive as SR is expected to be. While residents may desire the return of the affected area to its original state, the cost of that last marginal improvement might be prohibitive. Recognize that:

C7.10.9.1. Costs may be difficult to assess in the short and intermediate terms.

C7.10.9.2. ‘‘Level of risk’’ rather than ‘‘cleanup level’’ is the preferred benchmark and/or goal.

C7.10.10. Unless the accident site is in an isolated location, there is likely to be at least a short-term economic impact on residents. Depending on the location, the OSC may have to address such issues as:

C7.10.10.1. Agricultural losses.

C7.10.10.2. Pressing for disaster area designation for Federal relief.

C7.10.10.3. Loss of work by residents.

C7.10.10.4. Impact on tourism.

C7.10.10.5. Impact on property values.

C7.10.11. The pre-accident usage of the affected area shall dictate (to some extent) the SR priorities to be set and methods to be used. Residential, commercial, industrial, agricultural, and forested areas each require a unique remediation plan.

C7.10.11.1. Contamination of two or more types of areas complicates SR.

C7.10.11.2. Prioritize for best use of remediation efforts and resources.

C7.10.11.3. The proposed remediation action may require a long-term change from prior usage.

C7.10.11.4. Timeframe for returning the area to near normal usage varies by affected area.

C7.10.12. Any intermediate action plan should also examine the impact on long-term SR. Questions to be addressed include:

C7.10.12.1. Does this step have to be reversed? At what cost, financially or in good will?

C7.10.12.2. Does the action increase the size of the contaminated area?

C7.10.12.3. What are the potential long-term political and social considerations?

C7.10.13. Remember the goals of intermediate actions: protect public health and environment, restore essential services, and develop the basis for a long-term plan. Intermediate actions are the start of an effective SR effort. They should be considered by the OSC from the onset.

C7.11. <u>LONG-TERM ACTIONS</u>

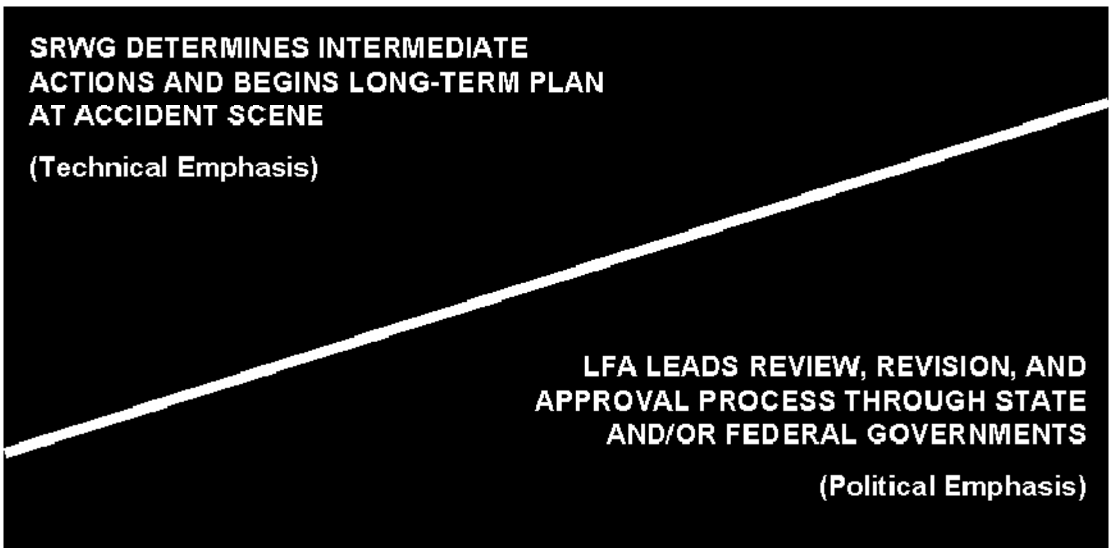
C7.11.1. Long-term actions are those steps taken to achieve ultimate remediation of the affected area to an agreed acceptable level as decided by all concerned. The major goals of this step are to:

C7.11.1.1. Protect the public health and environment (long term).

C7.11.1.2. Restore the affected area to a level that is technically and fiscally achievable within socially and politically acceptable guidelines.

C7.11.2. The method of achieving these goals shall be detailed in the final SR plan developed by the SRWG. During this step of the process, there is a gradual shift away from accident scene-oriented activities and intermediate actions to long-term planning. During this step, the SRWG membership tackles the difficult process of completing a plan of action that shall gain Government and public approval. Figure C7.F6., below, denotes the shift in responsibility from the accident scene to higher level Federal and State organizations during this step.

Figure C7.F6. Notional SR Plan and Approval Process



C7.12. CHANGING ROLES AND RELATIONSHIPS

C7.12.1. The SRWG continues to play a major role in developing the SR plan; however, as the focus of activity shifts to long-term planning, the roles and relationships of organizations supporting the SRWG shall change. While circumstances shall dictate the precise changes, planners should anticipate the following:

C7.12.1.1. The OSC's role shall diminish as a leader in the SR effort. The LFA is likely to continue to be the Department of Defense or the DOE/NNSA, but the OSC shall become more of a coordinator. His or her deputy or designated representative may assume the lead role in the SRWG. As the preliminary plan is submitted and the long process of approval begins, when the Department of Defense is the LFA, expect the Department of Defense to assign a Remedial Project Manager to replace the OSC in this role.

C7.12.1.2. State and local officials shall assume more authority for coordinating the SRWG and developing the final remediation plans. Federal response organizations shall continue their supporting roles.

C7.12.1.3. Proposed SR actions shall get greater public scrutiny. There shall be increased public and political influence on the decision-making process.

C7.12.1.4. Initiating actions shall be more complicated, requiring approval at more levels of Government before any SR activity begins.

C7.12.1.5. The Federal Radiological Preparedness Coordinating Committee (FRPCC) is likely to assume the role of coordinating national-level approval of the long-term plan.

C7.12.2. Regardless of the changing roles and relationships, the SRWG stays the central planning organization for SR. During this phase, the SRWG shall consider many of the typical long-term actions identified in section C7.13., below.

C7.13. PLANNING FOR LONG-TERM ACTIONS

C7.13.1. Long-term SR actions are similar in many respects to those carried out in the intermediate action phase. A high level of public involvement may be expected as SR transitions to a long-term program. The OSC or designee and staff should be prepared to respond accordingly and consider the following areas when addressing long-term actions:

C7.13.1.1. Environmental groups shall be closely monitoring the actions proposed and taken.

C7.13.1.2. Citizens committees may form to influence plan development and ensure compliance.

C7.13.1.3. Congressional interest shall be extensive throughout the process.

C7.13.1.4. Legal officers should be prepared to respond to expected lawsuits.

C7.13.1.5. Business representatives may be pushing for quick resolution of complications affecting commercial enterprises.

C7.13.1.6. Public presentations, news releases, news briefings, news media interviews, or newsletters are a means to keep the public informed.

C7.13.2. Establishing cleanup criteria may be a long process as various interests propose their own preferred standards. SR planners stress that preliminary plans should be based on a health risk assessment analysis rather than cleanup levels. Achieving consensus among those directly involved may be the greatest task facing the remediation authorities. Ultimately, the standard must be developed in consultation with officials at Federal, State, and local levels. It is suggested that:

C7.13.2.1. It first be determined what has to be cleaned up.

C7.13.2.2. Decontamination steps to reach the agreed levels be determined.

C7.13.2.3. The standard, the bases of the standard, and how to reach it be clearly stated and explained during the approval process.

C7.13.3. Waste disposal may be a monumental challenge due to the variables of a nuclear weapon accident. Planners must:

C7.13.3.1. Determine the type of material to be removed (i.e., water, soil, sand, stone, rock, and trees).

C7.13.3.2. Determine the level of contamination in the waste material.

C7.13.3.3. Determine the quantity of contaminated materials and waste to be removed.

C7.13.3.4. Determine where radioactive waste shall go for processing and/or disposal.

C7.13.3.5. Consider on-site disposal.

C7.13.3.6. Locate appropriate shipping containers; determine size and composition.

C7.13.3.7. Select the type or types of transportation: air, rail, highway, or water.

C7.13.3.8. Identify the best route, depending on means of transportation.

C7.13.3.9. Maintain coordination between the OSC or designee, the FCO, and civilian authorities.

C7.13.3.10. Get approvals.

C7.13.4. Health risks potentially exist until the last container of waste is removed, so health concerns must stay a major part of the remediation program. Basically, a long-term SR plan is a continuation of the program established as an intermediate action and includes, but is not limited to:

C7.13.4.1. An effective contamination monitoring program.

C7.13.4.2. Maintenance of security around the contaminated area.

C7.13.4.3. Continued bioassay programs.

C7.13.4.4. Monitoring food sources, packaging, and handling.

C7.13.5. Medical tracking of people actually or potentially contaminated is a responsibility of the LFA. Planners should address:

C7.13.5.1. Monitoring of bioassay program results for remediation workers and the public.

C7.13.5.2. Extended follow-up monitoring of exposed individuals.

C7.13.5.3. Source of medical personnel.

C7.13.5.4. Determining how long to track.

C7.13.5.5. Computerization of program for ease of monitoring.

C7.13.6. The economic impact of remediation activities needs to be considered to the maximum extent possible. For example:

C7.13.6.1. Legal ramifications (i.e., lawsuits, challenges to authority to perform tasks).

C7.13.6.2. Federal disaster assistance: amount, source, and disbursement.

C7.13.6.3. May the restrictions within the contaminated area cause temporary or permanent job loss?

C7.13.6.4. Might apprehensive citizens move away, lowering the economic viability of the area?

C7.13.6.5. If a tourist attraction, what actions are needed to dispel negative public perceptions?

C7.13.7. It is not enough simply to design a long-term remediation program of actions that shall return the affected area to agreed conditions; a long-term monitoring plan to ensure goals are being reached must be included. Suggested steps:

C7.13.7.1. Develop and gain approval of the monitoring plan along with the overall program.

C7.13.7.2. Make regular reports to the public; keeping them informed prevents many problems.

C7.13.7.3. Computerize the process.

C7.13.8. Environmental consequences of any action, planned or accidental, must be at or near the top of the long-term remediation program.

C7.13.8.1. Consider the impact of a Remedial Investigation/Feasibility Study (RI/FS).

C7.13.8.2. Bring environmental interest groups into the planning process early.

C7.13.8.3. Expect to receive legal challenges over any or all actions affecting the environment.

C7.13.9. Remediation of the area is a highly visible undertaking that may be praised and criticized. Avoid being affected by either extreme and maintain focus on the goal by keeping in mind that:

C7.13.9.1. Supporting State and local decisions, if possible, makes the job easier.

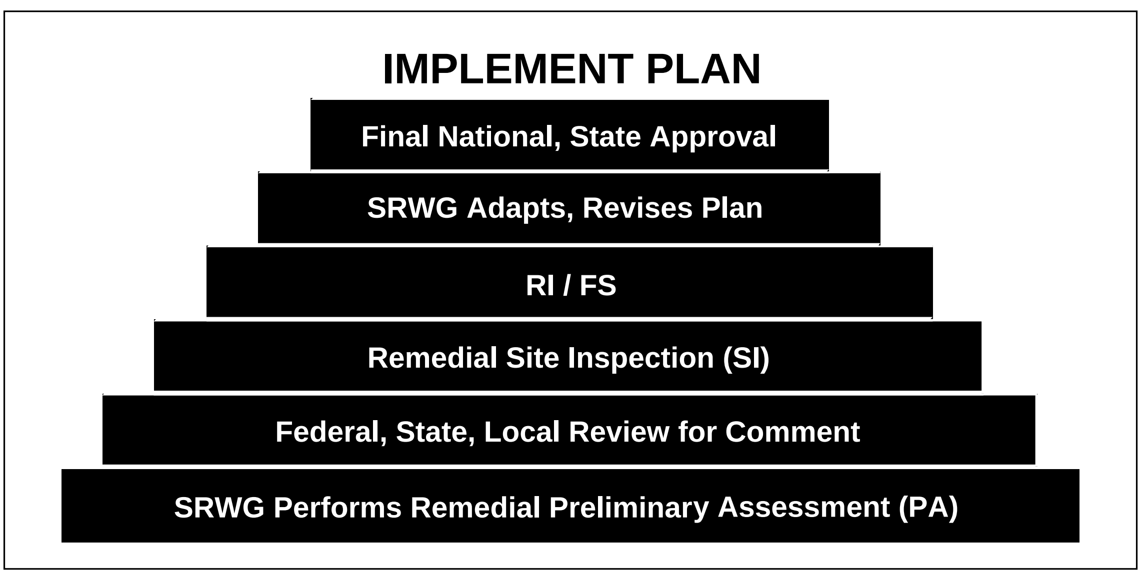
C7.13.9.2. Reaching consensus on what is technically achievable while being socially and politically acceptable is a considerable challenge.

C7.13.9.3. While a budget should be developed, the cost of remediation actions should not be the driving factor in developing a remediation plan. It should be understood though, that ignorance, fear, and exaggeration of the risks may drive the cleanup costs to enormous extremes. Therefore, the agreed on cleanup goals and their bases must be realistic, clear, concise, and well published.

C7.14. <u>THE APPROVAL PROCESS</u>

C7.14.1. The SR guidance indicated in this chapter has stressed the concept of coordination and communication among all SR participants throughout the planning and remediation process. Final approval of the SR plan may be a long and complicated process requiring coordination with multiple levels of government and extensive public involvement. Figure C7.F7., below, summarizes this process.

Figure C7.F7. <u>Steps in the Approval Process</u>



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C7.14.2. Under the direction of the lead agency, the SRWG performs a remedial PA. Federal, State, and local authorities shall provide an initial review that paves the way for a remedial SI, which builds on the information collected in the remedial PA. This environmental study asks for formal public comment on the remediation plan; however, SR planners stress that any plan that overlooks public comment throughout the process is flawed. After the SI, the RI/FS is conducted. The purpose of the RI is to collect data necessary to adequately characterize the site for developing and evaluating effective remedial alternatives. The FS is to ensure that appropriate remedial alternatives are developed and evaluated so that relevant information on the remedial action options may be presented to a decision maker and an appropriate remedy may be selected. Final remediation goals shall then be determined. Planners should not wait until the RI/FS to incorporate public views and concerns. The SRWG shall consider all comments on the plan, revise accordingly, and submit a final plan for approval. The SR plan shall ultimately be approved by the Governor of the State involved and by the Federal Government. The mechanism for accomplishing this approval on the Federal side is pending and shall be refined when the NRP is published; however, the FRPCC is expected to coordinate Federal approval of the plan at the national level.

C8. CHAPTER 8

SHIPBOARD ACCIDENT RESPONSE

C8.1. GENERAL

A shipboard nuclear weapon accident differs from land-based scenarios in several aspects. A fire or explosion associated with the accident may cause loss of the ship. Results of shipboard fires are well known and documented in repair party training and procedures manuals. Explosions, whether from a nuclear weapon or some other source (for example, petroleum fuels or conventional weapons) may cause severe damage affecting the safety and seaworthiness of the ship. Although the initial response by shipboard personnel shall be the same whether an accident occurs at sea or in port, the frequent lack of immediate assistance at sea increases the importance of correct and adequate response by shipboard personnel. A significant difference between a shipboard nuclear weapon accident and a land-based nuclear weapon accident is that the ship may, depending on the damage sustained, be directed to another location for weapon recovery operations and decontamination.

C8.2. PURPOSE AND SCOPE

In a nuclear weapon accident, the CO shall focus attention on saving the ship and crew, protecting the public from health hazards, and keeping the chain-of-command informed of the situation. This chapter provides guidance on aspects of a nuclear weapon accident response unique to the shipboard environment.

C8.3. RESPONSE ORGANIZATIONS

A ship's damage control organization shall provide the initial response to a shipboard nuclear weapon accident and shall be supplemented by the following:

C8.3.1. EOD Detachment. Composed of one officer and at least five enlisted EOD specialists assigned to ships in a Battle Group or detachments permanently assigned to major U.S. port facilities throughout the world and trained to respond to a nuclear weapon accident.

C8.3.2. Radiation Monitoring Team. Comprised of members of the ship's crew, this response element is trained to operate RADIAC instruments and man the CCSs or Decontamination Stations.

C8.4. EQUIPMENT

The function of radiation detection equipment is discussed in Appendix 3. The availability of air monitoring equipment to a ship depends on the ship's weapons maintenance capability for

airborne radioactive material detection equipment. EOD teams have equipment for detecting gaseous radioactivity.

C8.5. PRE-ACCIDENT PREPARATION

The key to responding to a nuclear weapon accident is planning, training, and adhering to precautionary measures during critical stages. In addition to having a well-exercised shipboard Nuclear Weapon Accident Bill, ships should take the following preventive measures during weapons movements when the chance for a nuclear weapon accident is at its peak:

C8.5.1. Alert Damage Control parties and ensure protective equipment, calibrated RADIAC, and firefighting equipment are available.

C8.5.2. Station security forces in the immediate area of the movement.

C8.5.3. Ensure that the Medical Department and EOD detachment (when available) are on alert.

C8.6. ACCIDENT

C8.6.1. Onboard a Moored Vessel. If a nuclear weapon accident occurs onboard a vessel, the CO of the affected vessel shall immediately assume IRF Commander duties and shall be supported by the shore organizations, as necessary. If a nuclear weapon accident occurs during a logistics move, the activity having custody and/or accountability of the weapon(s) shall assume IRF duties. During missile on-load, this occurs after the missile ground strap has been connected, or when warhead accountability has been transferred to the vessel. During off-load, this occurs when the missile ground strap is removed and when accountability has transferred from the vessel to the courier. For Tomahawk Land Attack Missile-Nuclear operations, accountability transfer affects responsibility transfer for accident response. The IRF Commander shall take all actions necessary to effectively contain and/or control the accident. Requests for assistance, notification of civilian authorities (see section C3.1.), OPREP-3 reporting (see paragraph C3.2.1.) and transfer of responsibility from the IRF to the RTF (see paragraph C4.2.1.) shall be conducted as previously described in this Manual (see Chapter 9 for additional information).

C8.6.2. At Sea

C8.6.2.1. At sea, the possibility of supplementation by an RTF or interdepartmental response forces shall be diminished and the action by the ship’s forces in affecting the response shall be critical. Some additional assistance by specialized units may be provided by ships in the vicinity. Also, EOD detachments may be deployed into the area by several transportation methods (see Chapter 9 for additional information).

C8.6.2.1.1. Initial Response Procedures. These procedures are the most crucial in gaining control of a nuclear accident. Accordingly, all ship force personnel who, by the nature

of their official duties, may become directly or indirectly involved in a nuclear accident are trained to perform the procedures in subparagraphs C8.6.2.1.1.1. through C8.6.2.1.1.5. When a nuclear accident occurs, the senior person present shall take charge at the scene and direct available personnel to:

C8.6.2.1.1.1. Try to save the lives of personnel involved.

C8.6.2.1.1.2. Try, when required, to extinguish a fire involving weapons or radioactive material using the firefighting guidance provided in Technical Publication 20-11 (reference (ab)).

C8.6.2.1.1.3. Establish a security perimeter surrounding the accident scene, limiting access to authorized personnel only. The security perimeter aboard ship may be defined by securing hatches to a compartment. In all cases, once the hatches have been secured, only personnel authorized by the senior person present shall be allowed at the accident scene.

C8.6.2.1.1.4. Direct all personnel at the scene to take emergency breathing precautions. Personnel shall at least cover their noses and mouths with a handkerchief or similar item to reduce inhalation of HAZMATs and smoke.

C8.6.2.1.1.5. Notify the Officer of the Deck (OOD) or the Command Duty Officer (CDO), as quickly as possible, that an accident has occurred in a compartment.

C8.6.2.1.2. When notified of an accident, the OOD or CDO shall:

C8.6.2.1.2.1. Initiate routine announcements over the shipboard intercom as follows: “NO EATING, DRINKING, OR SMOKING IS ALLOWED UNTIL FURTHER NOTICE.”

C8.6.2.1.2.2. Initiate standard shipboard damage control procedures including initiating a radiation plot; identifying route(s) to the Decontamination Station; and recommending changes to the ship’s heading to vent smoke, toxic gases, and contaminated firefighting water. Near shore releases should be done as a last resort action.

C8.6.2.1.2.3. Prepare to initiate Decontamination Station procedures.

C8.6.2.1.2.4. Begin initial OPREP-3.

C8.6.2.1.2.5. If in an in-port status, prepare to help the IRF or RTF Commander and any other follow-on forces.

C8.6.2.1.2.6. Continue OPREP-3 situation reports, as required.

C8.6.2.1.2.7. Request, if required, helicopter and/or parachute insertion of nearest EOD Detachment.

C8.6.2.2. Follow-On Response Procedures. These procedures are an extension of the initial response procedures; however, they include more detailed procedures for providing positive control of an accident scene. The responsibility of executing these procedures rests with the senior person on board or, in the case of an in-port accident, the shore establishment's designated IRF.

C8.6.2.2.1. As soon as possible after notification of an accident, damage control RADCON should conduct beta and/or gamma detection operations. RADCON gamma radiation monitors should then proceed to the extremities of the accident scene, maintaining constant surveillance of the instrument to detect increases in gamma radiation. Any radiation reading above normal background shall be reported immediately in accordance with standard Type Commander procedures.

C8.6.2.2.2. Public Affairs. At sea, Public Affairs shall be the responsibility of the Fleet Commander. The CO informs the ship's crew on PA releases and, before they debark or use any non-official off-ship communications, on procedures for responding to requests for information from the news media or from families. When the ship is in port, the Fleet Commander or his designated area coordinator shall coordinate public affairs.

C8.6.2.2.3. Security. Unless accident damage to the ship and/or weapon(s) has destroyed the normal security provisions for the weapon(s), additional security shall not be needed. Additional security is provided, if required, to ensure continued weapon protection and to prevent unauthorized access.

C8.6.2.2.4. Debriefings. All the ship's crew members with information as to the cause of the accident, and particularly those personnel who observed the extent of damage to the weapon(s), should be identified to assist in the accident investigation and debriefed to assess potential internal damage to the weapon.

C8.6.2.2.5. Follow-On Response at Sea. Weather and sea conditions, the extent of damage to the ship, remaining hazards to the ship and crew, and the time required to get either expert assistance on board or move the ship to suitable facilities, all affect the specific follow-on response actions that the CO might direct while at sea. Also, guidance shall be provided by the Fleet Commander, and the higher authority must have estimates of damage to the ship and weapon(s). Moreover, the ship must informed of the estimated time of arrival and the nature of any technical assistance being sent, and be directed to an appropriate port. Much of the technical assistance discussed in Chapter 2 may be airlifted to the accident ship, or a suitable ship in the vicinity for direct assistance at sea, when dictated, due to damage, contamination, or other conditions.

C8.6.2.2.5.1. Logistics. Resources shall be limited to those on board. Priority should be given to performing operations to reduce any hazards to the ship's personnel and damage to critical equipment, including RADIACs.

C8.6.2.2.5.2. Ship Decontamination. The amount of decontamination that the ship's personnel are able to perform shall be limited by the number of RADIACs available to

monitor and remonitor surfaces being decontaminated and to operate the Decontamination Station. Simple cleaning techniques are frequently effective in reducing, if not removing, contamination from many of the surfaces on a ship.

C8.6.2.2.6. Follow-On Response in Port. The follow-on response in port shall be the responsibility of the shore establishment, and shall follow procedures described in Chapter 2.

C8.6.2.3. Claims. Any contaminated personal property belonging to the ship's personnel should be collected and marked with the owner's identification. In general, decontamination of high value items, or items that the owner may not easily replace, must not be attempted by ship's personnel. Replacement of personal property that may not be decontaminated shall be processed in accordance with applicable claims regulations.

C9. CHAPTER 9

FOREIGN TERRITORY U.S. NUCLEAR WEAPON ACCIDENT RESPONSE CONCEPT OF OPERATIONS

C9.1. OVERVIEW

C9.1.1. This chapter discusses the response to a U.S. nuclear weapon accident in foreign territory. This chapter does not include procedures for responding to a nuclear weapon accident that originates from a foreign country's indigenous capabilities. Nuclear weapon accident response in foreign countries differs from a domestic nuclear weapon accident response in two basic ways. First, all response actions must be performed with due regard to the sovereign rights of the host nation. All aspects of the U.S. response shall be coordinated with the host nation. There may be existing agreements and plans with the that shall address the relationship between U.S. and host nation responders. These agreements may direct response procedures that differ from those used in U.S. territory. In countries lacking specific bilateral Nuclear Accident and/or Incident agreements, the DOS, the Combatant Commanders and host nation authorities shall use other existing, non-nuclear weapons-related bilateral agreements or arrangements as the basis for establishing bilateral major accident and/or radiological response plans. These plans shall include response procedures for accidents and/or incidents occurring or having effects outside the boundaries of a U.S. or host nation military installation. Second, the DOS shall be the LFA for the U.S. response, in accordance with Presidential Directive/National Security Council-27 (reference (ac)). Although DoD assets shall form the preponderance of the U.S. response, it shall be necessary to closely coordinate the foreign territory activities of the Department of Defense, the DOE, and other responding U.S. assets with the DOS Operations Center and the Chief of Mission (COM) at the U.S. Embassy in the affected country.

C9.1.2. While U.S. responding forces may wish to plan for all five phases of the operation, planners must recognize that the host nation has primary responsibility for managing the overall accident response. Therefore, the concept of operations by an IRF or RTF for U.S. territory accidents may have to be adapted to the host nations' methodology. Also, while operational Phases I-IV may occur more or less as outlined in this Manual, all aspects of Phase V, SR, shall require careful planning and full coordination with the U.S. Embassy.

C9.2. PHASE I: NOTIFICATION AND DEPLOYMENT

The notification and deployment phase for a U.S. nuclear weapon accident in foreign territory begins once the accident has occurred and ends when response forces arrive at the accident site. Actions taken during this phase include: Notifying appropriate host nation and U.S. Federal authorities; ensuring coordination between U.S. Federal Agencies (the DOS, the Department of Defense, the DOE/NNSA), the U.S. Embassy, and host nation authorities; deploying a U.S. IRF; and executing logistics plans to deploy additional assets to the accident site, as requested by the COM and/or RTF.

C9.2.1. Departmental Notification. If a U.S. nuclear weapons accident occurs within a host nation, notification of the accident shall be reported to the NMCC, the U.S. COM, the appropriate Combatant Commander, the DOS, and predetermined host nation authorities, usually the Ministry of Defense, or as specified in appropriate Combatant Command Directives or U.S.-host nation Arrangements or Agreements. The DoD and DOE/NNSA notification processes are described in Chapter 3. During routine movements of nuclear weapons to, from, and over a host nation, the movements shall be coordinated through the office of the U.S. COM and the DOS operations center.

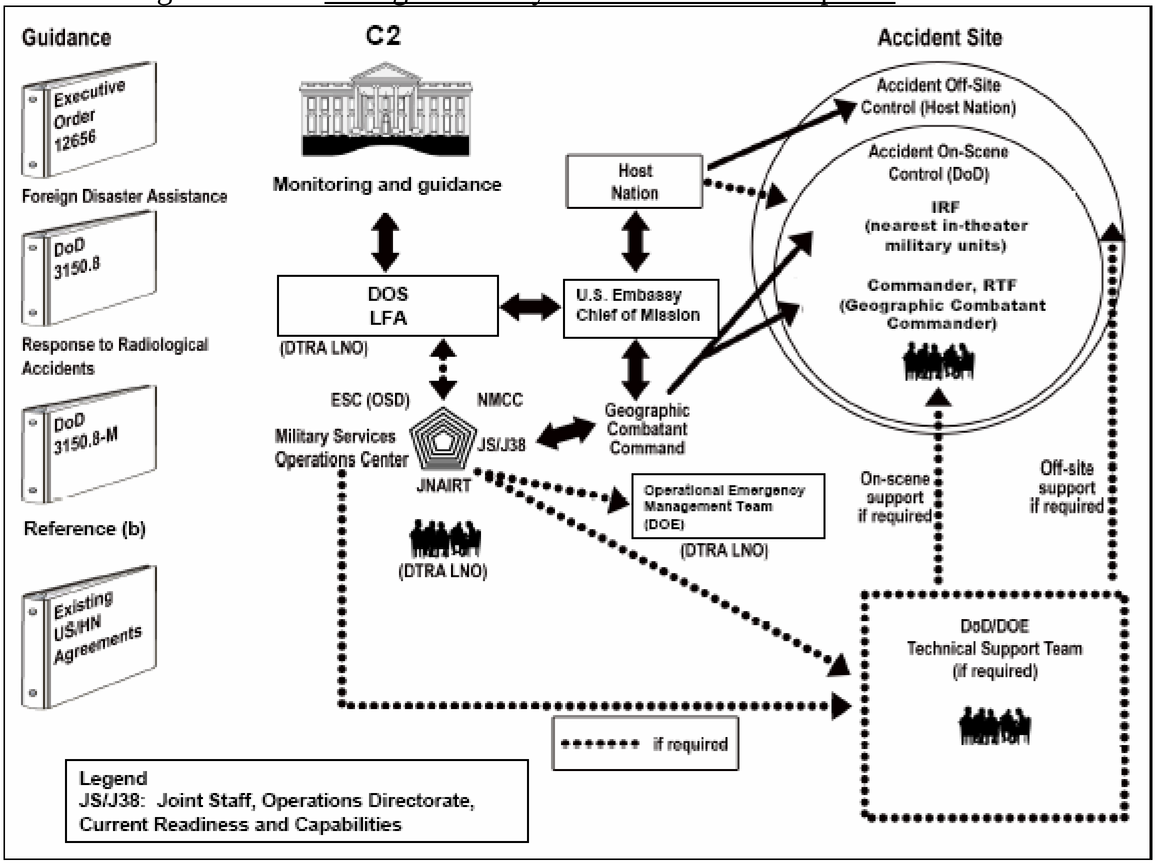
C9.2.2. Activation and Deployment. The U.S. COM (i.e., the ambassador or Charge d'Affairs) is the senior USG Official within a host nation where a potential accident might occur. The ambassador, et al, and the Combatant Commander of the AOR where the accident occurred have dual and sometimes overlapping responsibilities for managing the U.S. response. Therefore, precedence has established the ambassador as the principal manager for the national, government to government, level response and interactions. The Combatant Commander is responsible for the U.S. Military response and for interacting with host nation military and civilian response elements at the scene of the accident. The ambassador and the Combatant Commander work in close coordination to ensure all political and military actions are in the best interest of public health, safety, and international political stability. They shall exchange LNOs to assure close communications and continuity of operations.

C9.2.2.1. The JNAIRT tasks the Combatant Command to provide the RTF and designate a General and/or Flag Officer to command the RTF and serve as the OSC responsible for all DoD assets. The Combatant Command coordinates closely with the COM and the host nation during all phases of the response to accomplish the mission. The OSC may request required technical assets from any Federal Agency. The OSC request shall usually be channeled through the JNAIRT, which shall task DoD assets and request other agency support. The support may be requested in the form of deployed forces or in the form of reachback assistance, which may be accomplished telephonically or through video teleconferencing.

C9.2.2.2. The host nation manages off-site activities, and may request, through the DOS or the COM, technical and logistic support from U.S. Agencies as required. On-site management shall be consistent with appropriate Combatant Command and Service Directives or specific U.S. and/or host nation Arrangements or Agreements. In either instance, the United States shall work closely with host nation national and local authorities to assure a fast, efficient, and coordinated response. The nature of the U.S. response may vary depending on many factors, including the terms of the agreement with the host nation.

C9.2.3. The U.S. Embassy Special Action Group may receive crisis supplementation through the interagency Consequence Management Support Team (CMST). This team of chemical, biological, and radiological and/or nuclear experts advises the COM on CM issues and may serve as the COM's designated coordinator of the USG's accident response. The CMST may also deploy liaison elements to the Combatant Command HQ, the RTF HQ, and the host nation crisis management center. Because the weapon is under DoD custody, the IRF shall be drawn from the nearest in-theater military organization capable of handling the mission.

Figure C9.F1. Foreign Territory Notification and Response



C9.3. PHASE II: INITIAL RESPONSE

C9.3.1. The Initial Response phase to a nuclear weapon accident begins when the accident occurs. The response is comprised mainly of actions by fire and rescue, emergency medical, and law enforcement personnel (a.k.a., first responders) whose response actions focus on treating and rescuing people injured in the accident, securing the area, and fighting fires. If the IRF must enter the country, it shall coordinate its deployment with the COM. Early in this phase, the IRF OSC and the initial response resources shall arrive at the scene and liaise with the host nation civil or military authorities on-site to establish a modus operandi and to reestablish custody and control of the nuclear weapons, SNM, and other weapons components. Also during this phase, the Department of Defense, the DOS, and the DOE shall, according to their current plans and policies, notify and mobilize response assets for deployment and support the NMCC, the JNAIRT, and host nation Embassies in Washington, as necessary. For a complete listing of Phase II activities, refer to U.S. and host nation agreements, arrangements, implementing joint operations plans, and appropriate Combatant Command and Service directives.

C9.3.2. Special Considerations. The initial deployment of each Federal Agency's assets shall be governed by individual plans that recognize each agency's lead responsibilities. However, the deployment should also be tailored to reflect the capabilities of host nation emergency response services. The deployment of additional U.S. response forces should be

carefully managed such that sufficient assets are on hand to perform accident response actions, but that they do not overwhelm host nation support capabilities.

C9.4. PHASE III: ACCIDENT SITE CONSOLIDATION

The arrival of the RTF and the full cadre of U.S. response assets to the accident site marks the beginning of Phase III, Accident Site Consolidation. The U.S. Embassy coordinates the entry of all U.S. assets into the country with the host nation government. The OSC shall lead the U.S. response efforts in coordination with the COM, and host nation authorities, consistent with appropriate Combatant Command and Service Directives, Service to Service Technical Arrangements, and/or specific nuclear weapons accident response arrangements and operations plans. A complete listing of actions required in Phase III shall also be listed in these authoritative documents. For a complete listing of Phase III activities, see Chapter 5. For a nuclear weapon accident in foreign territory, the OSC should:

C9.4.1. Maintain liaison with the U.S. Embassy and, as appropriate, the host nation authorities;

C9.4.2. Coordinate with the U.S. Embassy Public Affairs Officer (PAO) to ensure consistency between COM and OSC information releases;

C9.4.3. Help host nation representatives develop and coordinate the SR plan;

C9.4.4. Coordinate with the DoD PLA to ensure actions of U.S. Military security personnel do not violate applicable status of forces agreements or host nation laws.

C9.5. PHASE IV: WEAPON RECOVERY OPERATIONS AND DISPOSITION

The weapon recovery operations and disposition phase involves EOD teams performing RSPs supplemented by follow-on support from the DOE/NNSA ARG. Disposition activities usually overlap with the accident site consolidation phase and begin after imminent lifesaving and firefighting activities have been completed. For additional information about operations during this phase, see Chapter 6. Special considerations for a response on foreign territory include:

C9.5.1. The Weapons Recovery Team may consist of DoD (EOD), DOE/NNSA (ARG), and host nation representatives. (host nation representation, if any, shall only be allowed per existing international agreements.) EOD representatives have the primary responsibility because the Department of Defense keeps custody of the weapon and its components.

C9.5.2. The Weapon Recovery Safety Evaluation Team (WRSET) from the U.S. Department of Defense, the DOE/NNSA, and a representative from the host nation, shall have access to weapon recovery plans and shall conduct an independent appraisal of weapon recovery plans that might prejudice nuclear detonation safety or present the potential for a significant release of radioactivity. (host nation representation, if any, on the WRSET shall only be allowed

per existing international agreements.) Any and all disclosures of weapon design information must be accomplished within the constraints of the AEA of 1954 (reference (h)), as amended.

C9.5.3. The OSC shall have overall responsibility at the accident site for technical operations, which shall be controlled through the JOC.

C9.6. PHASE V: SR

SR is that phase of the radiological accident response that primarily deals with environmental management activities of the affected area. SR is closely integrated with other phases of accident response. Many of the response teams that arrive early on to support the emergency response and recovery phases may stay at the accident site in some capacity to support SR. Ideally, the work of SR begins when response organizations (in close coordination with the host nation) develop plans to integrate their forces at an accident site. An RC may be formed to propose a methodology for managing remediation issues; the group should be prepared to liaise with higher authorities to ensure that early containment and recommendation are not impeded by interdepartmental conflicts.

C10. CHAPTER 10

RADIOLOGICAL HAZARD AND SAFETY ENVIRONMENTAL MONITORING

C10.1. GENERAL

A nuclear weapon accident is different from other accidents due to the possibility of radioactive contamination at the immediate accident site and extending beyond the accident vicinity. The complexities of a nuclear weapon accident are compounded further by general lack of public understanding of radiological hazards. The OSC must quickly establish a vigorous and comprehensive health physics program to manage the health and safety aspects of a nuclear weapons accident. A good health physics program provides for civil official involvement in the cooperative development of response efforts and a site restoration plan.

C10.2. PURPOSE AND SCOPE

This chapter provides information on health physics and guidance on the radiological safety and other hazards associated with a nuclear weapon accident. Also included is information on the RADCON resources available, the hazards and characteristics of radioactive materials present, and suggested methods for detecting these hazards and protecting personnel from them. This information assists the OSC in the operations under his or her control. The ASHG is the OSC's organizational means to task on-site hazard and radiological data collection and analyze data collected for the most accurate and complete hazard and/or radiological assessment. This chapter provides recommendations, advice, sample forms, and assistance to civil authorities with jurisdiction over areas affected by the accident for both radiological hazards and other nonradiological hazards of a nuclear weapon accident. The ASHG is the on-site equivalent of the FRMAC and the two organizations coordinate closely. The FRMAC supports the OSC with off-site monitoring and assessment. In accordance with reference (e), the FRMAC may also be activated under a direct request from State and local governments and other Federal Agencies.

C10.3. SPECIFIC REQUIREMENTS

DoD and DOE/NNSA response activities include protecting response force personnel and the public from on-site hazards associated with a nuclear weapon accident and to lessen potential health and safety problems. To accomplish this, the Department of Defense and the DOE/NNSA establish an ASHG to:

C10.3.1. Initiate on-site hazard and radiation health, weapons recovery, and safety and environmental monitoring.

C10.3.2. Determine if radioactive contamination has been released.

C10.3.3. Advise the OSC of precautionary measures for residents and other persons in potentially contaminated areas. Convey risk assessment information.

C10.3.4. Coordinate and integrate the capabilities of specialized teams working on-site.

C10.3.5. Implement applicable health and safety standards and monitor the safety procedures of all personnel taking part in weapon recovery operations.

C10.3.6. Monitor the tempo of the response effort and, if required, recommend a safety stand-down period to prevent undue physical and mental fatigue.

C10.3.7. Manage and advise for actual and potential medical casualties in accordance with guidelines in the AFRRI's "Medical Management of Radiological Casualties"[21] (reference (ad)); Army FM 4-02.283, Navy NTRP 4-02.21, Air Force Manual (AFMAN) 44-161(I), Marine Corps MCRP 4-11.1B "Treatment of Nuclear and Radiological Casualties" (reference (ae)); and other accepted medical practice.

C10.3.8. Brief and train people not previously designated as radiation workers who shall be working in the contaminated area on PPE, hazards, and safety measures before entering potentially contaminated areas.

C10.3.9. Establish dosimetry and documentation procedures as early as Phase II, and especially during personnel decontamination and remediation operations.

C10.3.10. Determine levels of contamination present and on-site boundaries of the contaminated areas through ground and air surveys. Establish a CCL that marks the approximate perimeter of the on-site contamination area.

C10.3.11. Develop and provide contamination plots to the OSC.

C10.3.12. Consolidate all radiological assessment information for on-site recovery operations and provide it to the OSC.

C10.3.13. Analyze and correlate all contamination data collected to identify inconsistencies requiring further investigation.

C10.3.14. Establish and operate a CCS for personnel and vehicles. If necessary, additional CCSs may be established.

C10.3.15. Review and correlate records from CCSs and other personnel processing points to ensure bioassays or other appropriate follow-up actions are taken.

C10.3.16. Establish a bioassay program.

[21] Available at www.afrri.usuhs.mil

C10.3.17. Recommend methods and procedures to prevent resuspension and spread of radioactive contamination in case of wind shifts.

C10.3.18. Refer all unofficial and media requests for information to the JIC/Combined Information Bureau (CIB). However, be prepared to present radiological contamination findings and results at press conferences and community forums, as directed. Present data in clear, concise, and non-technical briefings, outlining hazards, precautionary measures, business recovery, and where to get more information and/or assistance.

C10.3.19. Liaise with the FRMAC and State and local authorities on off-site issues.

C10.3.20. When the NDA, NSA, or Security Area is dissolved, transfer applicable control of ASHG personnel and equipment as requested to support FRMAC operations (if on U.S. territory) or to the corresponding host nation authorities off-site.

C10.3.21. With the EPA, help the FRMAC develop and coordinate the SR plan.

C10.3.22. Track all medical and radiological casualties.

C10.4. RESOURCES

C10.4.1. Response Force Resources. Response forces should have a full complement of operable and calibrated radiological monitoring equipment. Sufficient quantities of materials should also be available for replacement or repair of critical or high failure rate components such as Mylar® probe faces. For the Department of Defense, replacement plans are necessary as RADIAC equipment available to IRFs may not meet initial operational needs after a large release of contamination. Although IRFs are equipped and trained to conduct radiation surveys for low levels of radioactive contamination, this is difficult to do over rough surfaces like rocks or plants, or over wet surfaces. Specialized DoD and DOE/NNSA teams are better equipped to monitor low-level contamination, and monitoring should wait until these specialized teams arrive. Appendix 3 has a list of radiological monitoring equipment used by the Services, with a summary of their capabilities and limitations. Additionally, personnel should know the various units in which contamination levels might be measured or reported and the method of converting from one unit to another. A conversion table for various measurements is provided in Appendix 13.

C10.4.2. Specialized Teams. Several specialized teams are available within the Department of Defense and the DOE/NNSA with substantial radiological monitoring, hazard assessment, and instrument repair capabilities; these teams may also provide field laboratories and analytical facilities. Specialized teams, when integrated into the response, provide adequate technical resources to completely assess the radiological hazards. Additionally, specialized DOE/NNSA teams, which have off-site responsibilities, should be integrated into the response. The DTRA runs the DoD part of the JNACC. HPAC development support is through the JNACC as well as the CMAT, which is an established and trained specialized team of advisors deployed to help the response manage all phases after a nuclear weapon accident. Specialized team operations are best integrated by establishing an ASHG, as discussed in section C10.3., above. When not

required on-site, DoD specialized teams should assist in the off-site radiological response efforts, as requested. The capabilities of the specialized teams are highlighted in Chapter 2.

C10.5. CONCEPT OF OPERATIONS

This concept of operations assumes that an accident has resulted in a release of contamination to areas beyond the immediate vicinity of the accident site. The distinction between on-site and off-site is significant for security and legal purposes; however, for effective collection and meaningful correlation of radiological data, the entire region of contamination must be treated as an entity. The on-site and off-site distinction should be considered only when assigning areas to monitoring teams. Possible response force actions are addressed first in this concept of operations (paragraphs C10.5.1 through C10.5.8.). Only limited equipment and expertise may be available to the IRF.

C10.5.1. IRF or RAP Team Actions. Within the constraints of available resources, the IRF or the RAP team arriving on scene should determine the absence or presence of any radiological problem and its nature, reduce possible radiation hazards to the public and response force personnel, identify all persons who may have been contaminated, decontaminate them as necessary and establish traceable records, recommend public confirmation of the accident to the OSC and provide appropriate news releases, and notify local officials of potential hazards.

C10.5.1.1. Pre-Deployment Actions

C10.5.1.1.1. Before leaving for the accident site, hazard plot delivery should be arranged to help determine potential areas of contamination to avoid contamination of response teams and equipment. ARAC and HPAC plots shall provide theoretical estimates of the radiation dose to personnel downwind during the accident. Also, plots shall provide the expected location and level of maximum contamination deposition on the ground. As it becomes known, specific accident data described in the appendices to this Manual should be provided to the ARAC facility at the LLNL.

C10.5.1.1.2. If an advance party is deployed, at least one trained person should have radiation detection instruments to determine if alpha-emitting contamination was dispersed and to confirm that no beta and/or gamma hazard exists. The sooner that confirmation of released contamination is established, the easier it is to develop a plan of action and communicate with involved civil authorities.

C10.5.1.2. Initial Actions

C10.5.1.2.1. If the OSC, or an advance party, deploys by helicopter to the accident site, an overflight of the accident scene and the downwind area may provide a rapid assessment of streets or roads in the area and the types and uses of potentially affected property. During helicopter operations, flights should stay above or clear of any smoke and at a sufficient altitude to prevent resuspension from the downdraft when flying over potentially contaminated areas. The landing zone should be upwind, or crosswind, from the accident site.

C10.5.1.2.2. After arrival at the site, a reconnaissance team consisting of an EOD element and/or other specialties should enter the accident site to inspect the area for hazards, determine the type(s) of contamination present, measure levels of contamination and initiate air sampling, mark a clear path, mark hazards, perform initial site stabilization and emergency procedures, and assess weapon status. The approach to the scene should be from upwind, if at all possible. The accident situation indicates whether the initial entry teams requires PPE or respiratory protection. PPE and respiratory protection should always be donned before entering a suspect area. Every consideration should be given to protecting the initial entry team and preventing undue public alarm. Until the hazards are identified, only essential personnel should enter the possible contamination or fragmentation area of the specific weapon(s). The generally accepted explosive safety distance for nuclear weapons is 770 m (2,500 feet); however, the contamination may extend beyond this distance. Fragmentation safety distances may be found in classified EOD publications. At this point, a temporary CCL should be considered. Later, when the boundary of the contaminated area is defined and explosive hazards are known, the control line may be moved for better access to the area. Contamination, or the lack thereof, should be reported immediately to the OSC.

C10.5.1.2.3. If radiation detection instruments are not yet on scene, observations from firefighters and witnesses and the condition of the wreckage or debris may indicate the possibility of contamination. Anticipated questions that may be asked to evaluate the release of contamination are:

C10.5.1.2.3.1. Was there an explosive detonation?

C10.5.1.2.3.2. Has a weapon undergone sustained burning?

C10.5.1.2.3.3. How many intact weapons or containers have been observed?

C10.5.1.2.3.4. Do broken or damaged weapons or containers appear to have been involved in an explosion or fire?

C10.5.1.2.4. If no contamination was released by the accident, the remaining radiological action becomes preparation for response in the event of a release during weapon recovery operations.

C10.5.1.3. If contamination is detected, authorities should be notified and the assistance of specialized radiological teams and the DOE/NNSA AMS requested. The highest priority should be action to initiate general public hazard abatement. Do not delay or omit any lifesaving measures because of radioactive contamination. If precautionary measures have not been implemented to reduce the hazard to the public, civil officials should be advised of the situation and consider possible actions. Actions that should be initiated include:

C10.5.1.3.1. Dispatch monitoring teams, with radios if possible, to conduct an initial survey of the security area after EOD personnel have found the area free of hazards. Before EOD inspection of the area, all down range personnel must be accompanied by EOD personnel.

C10.5.1.3.2. Recommend public confirmation of the accident to the OSC. Prepare appropriate news releases.

C10.5.1.3.3. Determine if medical treatment facilities receiving casualties have a suitable radiation monitoring capability. If not, dispatch a monitor to determine if the casualties, and subsequently the surrounding area, were contaminated. Initiate notification of monitoring teams available in the private sector. Also help ensure that contamination has not spread in the facility. Procedures that a medical treatment facility may use to reduce the spread of contamination are described in Chapter 11.

C10.5.1.3.4. Identify any witnesses, bystanders, or others present at the accident, in conjunction with civil officials.

C10.5.1.3.5. Establish a CCS and a personnel monitoring program. If available, civil authorities and/or officials should have monitoring assistance provided at established personnel processing points.

C10.5.1.3.6. Arrange to have a fixative applied as soon as possible to reduce resuspension and associated inhalation.

C10.5.1.3.7. Implement procedures to protect response personnel. Protective coveralls (personal protective clothing), hoods, gloves, and boots are necessary to protect response personnel from contamination and prevent its spread to uncontaminated areas. Respiratory protection is required if airborne contamination is detected. Using Service approved protective masks may provide respiratory protection in most instances. If extremely high contamination levels of tritium are suspected in a confined area, firefighting and other special actions require a positive pressure Self-Contained Breathing Apparatus (SCBA). Unless an accident is contained within an enclosed space, such as a magazine, only those personnel working directly with the weapon need take precautions against tritium.

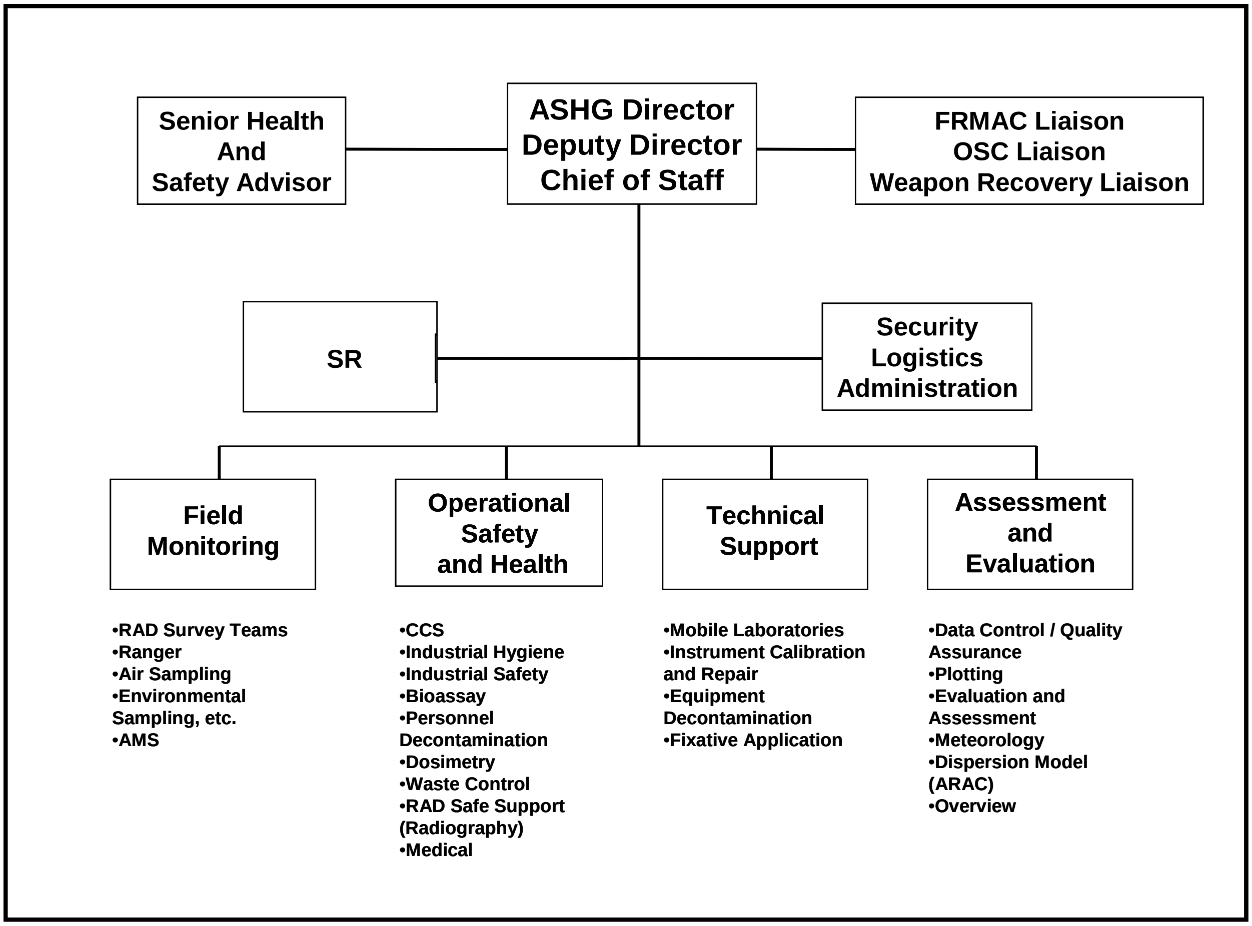
C10.5.1.3.8. Develop and implement plans for controlling the spread of contamination. Administrative controls must stop contamination from being spread by personnel or equipment and protect response force personnel and the general public. This control is usually established by determining a control area and limiting access and exit through a CCS. The perimeter of the CCA shall be near the line defined by the perimeter survey; however, early in the response before a full perimeter survey is completed, a buffer zone may be considered. If the control area extends beyond the NDA or NSA, civil authorities and/or officials shall help to establish and maintain the control area perimeter. Personnel and equipment should not leave the control area until monitored and decontaminated. Injured personnel should be monitored and decontaminated to the extent their condition allows. A case-by-case exception to this policy is necessary in life threatening situations.

C10.5.1.3.9. Establish the location and initial operation of the Command Post, Operations Area, ASHG, and Base Camp. This is discussed in Chapter 2.

C10.5.2. RTF Actions. RTF personnel shall review IRF or RAP team actions once they arrive on-scene. Actions include the status of identification and care of potentially contaminated people, casualties, and fatalities; the results of radiation surveys and air sampling or an ARAC and/or HPAC-computed assessment if the survey is not completed; radiological response assets on-scene or expected; logs and records; and the location for the ASHG. Representatives from the DOE/NNSA, the FEMA, the EPA, and State and local governments come together to serve as the primary off-site health and safety interface with the public. However, the Department of Defense should continue to provide assistance and radiation monitoring support, as necessary. During those periods early in the response when EOD operations limit access to the accident site, radiological survey teams should only support the weapon recovery efforts. Off-site radiological surveys require coordination with civil authorities. This arrangement may be understood by explaining the role of the ASHG and the FRMAC and by inviting civil government-approved radiological response organizations to participate in FRMAC operation. DoD specialized teams and the DOE/NNSA ARG are integral parts of the response. The OSC should integrate DOE/NNSA ARG radiological assets into the ASHG organization.

C10.5.2.1. ASHG. The ASHG is the organization that oversees the on-site hazard and radiological data collection and assessment efforts. By analyzing data, it provides accurate and complete on-site hazard and/or radiological recommendations. The ASHG Director is a senior DoD health physicist if the Department of Defense is the LFA for the accident with the DOE/NNSA providing the Deputy Director. If the DOE/NNSA is the LFA, it provides the Director and the Department of Defense provides the Deputy. These personnel should be knowledgeable about data on-site and how to best use the technical resources available. The recommended functional organization is shown in figure C10.F1., below.

Figure C10.F1. ASHG Functional Organization



C10.5.2.1.1. On-site monitoring data are processed through and further distributed by the ASHG to the FRMAC. (Exercise appropriate communications security (COMSEC) in the exchange of on-site data and/or information because of the potential for classification issues).

C10.5.2.1.2. The ASHG is the single control point for all on-site hazard and/or radiological data and they shall provide the most rapid information available to both military and civil users. After the initial response, the ASHG establishes a radiation and dosimetry program that meets the needs and requirements for personnel working in or entering the on-site CCA. The ASHG should:

C10.5.2.1.2.1. Collect radiological and hazard data required by the OSC on-site. Refer all unofficial requests for contamination information to the JIC.

C10.5.2.1.2.2. Run the HPAC or the ARAC for an initial contamination plot and make the plot available to the OSC, correlate the plot with survey results for confirmation and/or validity, and rerun the model, as required.

C10.5.2.1.2.3. Analyze and correlate all contamination data collected to identify inconsistencies that require further investigation.

C10.5.2.1.2.4. Review and correlate records from CCS and other personnel processing points to ensure bioassays or other appropriate follow-up actions are taken.

C10.5.2.1.2.5. Implement the OSC's health and safety standards and monitor the safety procedures of all responders taking part in weapon recovery operations.

C10.5.2.1.2.6. Brief and train people not designated previously as radiation workers who shall be working in the contaminated area on PPE, hazards, and safety measures.

C10.5.2.1.3. Consolidate all radiological assessment information for on-site recovery operations and provide it to the OSC.

C10.5.2.1.4. When the NDA/NSA is dissolved, ASHG personnel and resources may be integrated into FRMAC operations, as requested.

C10.5.2.2. Radiological Surveys. Radiological surveys and other radiological data are required by the OSC and civil authorities and/or officials to identify actions to reduce hazards to the response force and the public. Site characterization and decontamination and remediation planning shall also need this information. Radiological survey and data requirements must be given to the FRMAC for implementation to quickly meet this requirement. Before beginning an extensive survey, select appropriate detection equipment, calibrate instruments, and determine the background readings. Surveys include NDA perimeter, area, and resource and/or facility surveys. The survey process may require days to weeks to complete. Survey procedures are in Appendix 6.

C10.5.2.3. Materials Sampling

C10.5.2.3.1. Environmental Sampling. Radiological survey data should be used to the greatest extent possible to determine areas and objects that must be sampled and for screening samples after collection. The use of radiological survey data is necessary to reduce personnel radiation exposure.

C10.5.2.3.1.1. Air sampling is conducted to determine if airborne contamination is present. It also provides a basis for estimating the radiation dose and/or exposure that people without respiratory protection may have received since the air sampling instruments were replaced.

C10.5.2.3.1.2. Soil, water, vegetation, and swipe sampling of hard surfaces is required. Sampling should be initiated in the contaminated area soon after the accident. Samples must also be taken at locations remote from the contaminated area to verify background readings. After this, samples are required periodically during the recovery process to determine radioactive material migration and dispersion and to substantiate decontamination and/or recovery completion. The ASHG, in cooperation with the FRMAC, shall determine on-site sampling boundaries, such as sample location(s), method, frequency, volume of sample, and size.

C10.5.2.3.2. Bioassay Program

C10.5.2.3.2.1. Bioassay methods estimate the amount of radioactive material deposited in the body. The methods use either direct measurement, e.g., sensitive X-ray detectors placed over the chest (lung counting) and/or other organs, or detection of radioactivity in the excreta (nasal mucous, feces, or urine).

C10.5.2.3.2.2. A bioassay program for potentially affected individuals is recommended to determine if an internal uptake occurred. Implementation of a bioassay program and the documented results shall be important in the fair settlement of any legal action that may occur in the years after a nuclear weapon accident. Personnel monitoring and bioassay programs are discussed in paragraph C10.5.2. and bioassay techniques are discussed in Appendix 8.

C10.5.2.4. Work Force Protection. Standard radiation accident and incident response procedures guide personnel protection during the first few days. As conditions stabilize, regulations governing work in radiation areas should be implemented. Participating organizations' or services' methods and previous doses, and whether their procedures jeopardize health and safety or unduly impair operations, must be considered. The ASHG implements the OSC's health and safety standards and closely monitors the safety procedures of all participating organizations. Personnel entering the contaminated areas, if not trained to work in a contamination environment, should be given specific guidance.

C10.5.2.5. Radiological Advisory to the JIC/CIB. All public release of information shall be processed in accordance with reference (x), and made through the JIC/CIB. Public interest in the actual or perceived radiological hazard from a nuclear weapon accident shall produce intense public concern and media scrutiny of response operations. The JIC/CIB requires assistance from the ASHG and the FRMAC in preparing press releases to reduce and allay these concerns. Any part of the public that may have been advised to take precautionary measures shall seek clear, understandable explanations of methods to protect their health and property. The public must be informed through the JIC/CIB and a public outreach program explaining the potential hazards, in terms that recognize the populace's knowledge level and understanding of radiation and its effects.

C10.5.2.6. Fixing of Contaminants. Fixatives should be used to reduce resuspension and the spread of contamination. If water is readily available, it may be used as a temporary fixative to reduce resuspension. Other more permanent fixatives may be used to reduce the spread of contamination by resuspension and runoff from highly contaminated areas. The use of fixatives in areas of low-level contamination is usually inappropriate. Fixatives may enhance or hinder decontamination and remediation operations and affect radiation survey procedures and, in fact, may generate mixed waste or conflict with EPA regulations. The DOE/NNSA ARG may provide information on the advantages and disadvantages of different types of fixatives and methods of application. They should be consulted before applying any fixatives.

C10.5.2.7. SR. Procedures and/or methods to return the accident scene to a technically achievable and financially acceptable condition begin early in the response effort. SR becomes a

major issue after classified information, weapons, weapon debris, and other hazards are removed. Several factors have significant influence on SR decisions and procedures, such as size of the contaminated area and topographical, geological, hydrological, meteorological, and demographic information. Other important aspects are use of the area and civil authorities' and/or officials' prerogatives for the area. Remediation shall include those measures to remove or neutralize the contamination. A component of the CMAT may analyze options and provide the on-site commander with costs.

C10.5.2.8. Disposal of Contaminated Waste. CCS operations and ASHG field laboratory operations create considerable quantities of contaminated waste. Provisions are required to store this waste temporarily in the contaminated area until it may be moved to a disposal site. Procedures for disposing of contaminated waste are addressed as part of SR. The SRWG shall develop a plan to dispose of contaminated waste as part of SR.

C10.5.2.9. Logistics Support for Radiological Operations. Radiological response assets arrive with sufficient supplies to last a few days. High use items that soon require resupply include hundreds of sets of personal protective clothing each day, 2-inch masking or duct tape, varied sizes of polyethylene bags, marking tape for contaminated materials, and respirator filters. Personal protective clothing may be laundered in special laundry facilities and reused. The turnaround time, when established, determines the approximate amount of anti-contamination clothing required. Close liaison shall be required between the ASHG and the OSC supply officer. Disposable personal protective clothing may prove more logistically practical in some circumstances.

C10.5.3. Radiological Hazards. The primary radiological hazard associated with a nuclear weapon accident is from fissile material, particularly alpha emitters. Sufficient quantities of beta and/or gamma emitters to pose a significant health problem are not usually present at a nuclear weapon accident.

C10.5.3.1. Radiological Hazard Assessment. From the outset, concern exists about the potential health hazard to the general public, particularly to those persons residing near the accident site. Considering possible radiation exposures is the primary method of estimating the potential health hazard. If no beta and/or gamma radiation is present, the primary risk is inhalation of alpha emitters that may cause a long-term increase in the likelihood of radiation-related diseases. Initial hazard assessments shall, of necessity, be based on limited information, assumptions, and worst-case projections of possible radiation doses received. The ARAC and the HPAC provide theoretical projections of the maximum internal radiation dose people may have received if outdoors without respiratory protection from the time of release to the effective time of the predictive plot. Exposure to resuspended contaminants usually results in doses that are a small fraction of the dose that would be received from exposure to the initial release for the same time period. Contamination released by the accident should not usually affect the safety of public water systems with adequate water treatment capability.

C10.5.3.2. Reduction of Public Exposure. The hazard assessment must be followed quickly by recommended precautionary and safety measures to protect the public from exposure. To control and reduce exposure, radioactive contaminants must be prevented from entering the body and confined to specific geographic areas so that the contamination may be removed

systematically. Methods for reducing the exposure to the public should be implemented by, or through, civil authorities and/or officials. Although political and possibly international issues may be involved, the ultimate decisions on measures to be taken should be based on health and safety considerations.

C10.5.3.2.1. The first Federal officials to arrive at the accident scene (typically the IRF or RAP team) may need to advise civil authorities and/or officials of recommended actions and provide technical assistance until appropriate civilian assets arrive. When contamination has been released, or when probable cause exists to believe that contamination was released, implementing precautionary measures to reduce exposure to radiation or contamination is appropriate, even though the response force personnel may not arrive for some time.

C10.5.3.2.2. Protective measures include:

C10.5.3.2.2.1. <u>Establishing a CCA</u>. This operation requires identifying people in the area during the accident and/or restricting access to the area. Any vehicles or people exiting the area should be identified and directed to go to a monitoring point immediately.

C10.5.3.2.2.2. <u>Sheltering</u>. Sheltering is used to reduce exposure to the initial release of contamination as it moves downwind and to reduce exposure to resuspended contamination before an evacuation. Officials advising people to seek shelter and providing the procedures to follow constitutes sheltering. The effectiveness of sheltering depends on following the procedures provided. Pets should also be gathered and sheltered to prevent spread of contamination. Livestock may continue to range free since they have little intimate contact with the general public.

C10.5.3.2.2.3. <u>Evacuation</u>. Contaminated areas must be defined and civil authorities must develop and implement an evacuation procedure. Civil authorities shall be responsible for the evacuation but may require radiological advice and assistance. Immediate evacuation of downwind personnel should be discouraged since the likelihood of contaminant inhalation may increase. Explosive or toxic materials may present an immediate hazard to people near the accident site and immediate evacuation should then be required.

C10.5.3.2.2.4. <u>Fixing Areas of High Contamination</u>. Areas of high contamination must be controlled to prevent spread by resuspension, water runoff, or personnel movement. Although fixing of contamination is part of the SR process, some fixing procedures may be necessary long before SR plans are implemented.

C10.5.4. <u>Respiratory and Whole Body Protection</u>. Protecting the general public, response force members, and workers in the accident area from exposure through inhalation is extremely important. Refer to Appendix 11 for additional guidance.

C10.5.5. <u>Radiation Surveys</u>. Extensive radiation surveys shall be required to identify and characterize the area so that decontamination and remediation plans may be developed and the results evaluated. Determining that contamination was released by the accident is very important; if release occurred, priority must be given to the actions to identify and reduce the hazards to people. These actions are included in Appendix 6.

C10.5.6. SR. SR involves negotiating cleanup levels and fixing or removing contamination. The removal is time-consuming and requires an extensive workload to collect, remove, decontaminate (if appropriate), and replace the topsoil. Monitoring is required during the removal process to verify that cleanup has been achieved.

C10.5.7. Verification. The decontamination effectiveness shall be verified by resampling, remonitoring, and/or resurveying the accident scene to determine that the cleanup levels are achieved.

C10.5.8. PARs and RERs. Provide appropriate protective action and RERs to the public. PARs are usually provided to the State through the LFA. The State then has the final determination in what PARs are issued and/or enacted. The PARs and RERs shall have been coordinated and/or reviewed by the cognizant Federal authority (the Department of Defense or the DOE/NNSA) and responsible civilian authorities and/or officials. The PARs and RERs shall consider PAGs issued by the EPA and State agencies. In an accident, PARs for initial notification or evacuation are likely not to have been prepared formally. The notification in the accident area should occur through visual means or word of mouth. Evacuation of about a 600 m disaster cordon might occur automatically or at the direction of civilian law enforcement personnel. A PAR for a controlled evacuation might be formalized in anticipation of a later release of HAZMAT or radioactive contamination. The PAR/RER format may at least include problem, discussion, action, coordination, and approval sections (the format should be site and situation specific). A sample PAR for controlled evacuation is shown in figure C10.F2., below.

Figure C10.F2. <u>Sample PAR Form</u>

(Sample PAR)

Protective Action Recommendation

For

Major Accident ______________________________ at (location)

Issued by:

<u>Problem</u>. An accident involving a propane truck and two Safe Secure Trailer (T1 and T2) vehicles carrying ___________(type)_____________ nuclear weapons occurred at (time, date, and location). The propane truck sideswiped T1 and collided with T2. A fire erupted causing the propane truck to explode. Shortly afterwards, the weapon in T2 experienced a conventional high explosive detonation, resulting in widespread contamination. The T1 vehicle sustained damage and skidded into a ditch, preventing access through its doors to the stored weapon inside.

<u>Discussion</u>. Actions to gain access into T1 and remove the weapon have been hampered. It is still possible, though highly improbable, that a second explosion might occur during access and removal of the weapon in T1. In the unlikely event of an explosion, debris might be thrown 4,000 feet with additional contamination released. As a result, an evacuation of (outline the specific area) has been ordered by the (civilian authority office).

<u>Action</u>. With the possibility of an explosion during access and removal operations involving the weapon in T1, the following area shall be evacuated. (Indicate the specific area to be vacated and a schedule indicating evacuation start, completion, verification of evacuation, work start, work completion, and return to the area). All personnel are required to sign in at a specific location(s) during evacuation to help local law enforcement and/or response force personnel verify that all personnel are out of the area before access and removal procedures begin. A holding area, for example, a gymnasium or school, may be a temporary area for evacuees. Also, the evacuees might be released for shopping or other activities outside the area. Once access and removal procedures are completed, the civil authorities shall determine when evacuees may return to their houses and/or businesses, if outside the contaminated area.

Release of this “Protective Action Recommendation” may not precede confirmation of the presence of a nuclear weapon by the On-Scene Commander (OSC) and should be coordinated with local officials and the OSC Public Affairs Officer before release.

C11. CHAPTER 11

MEDICAL

C11.1. GENERAL

C11.1.1. Radioactive contamination may result from a nuclear weapon accident. In instances when radioactive contamination is not dispersed (for example, the September 1980 TITAN II explosion at Damascus, AR), the medical requirements, while greatly simplified, may still be significant. There is a potential for a large number of casualties through detonation or the presence of noxious fumes. Specifically, emergency lifesaving procedures in any major disaster are applicable to a nuclear weapon accident. Even without the presence of radioactive contamination, other weapon-specific non-radioactive toxic hazards may exist; however, lifesaving procedures should not be delayed or omitted due to radioactive contamination. The presence of radioactive contamination should not by itself delay emergency medical response although other weapon-specific non-radioactive hazards should be considered before emergency care is rendered.

C11.1.2. If radioactive contaminants are dispersed, medical personnel must treat people who may be contaminated externally or internally. Treatment of contaminated patients requires special handling similar to standard precautions commonly used by medical care providers. For externally deposited radioactive material, decontamination involves removal and proper storage of clothing, as well as a standard washing procedure using soap and water. Significant decontamination (greater than 90 percent) may be achieved by removing contaminated clothing. Contaminated wounds are surveyed and debrided based on standard wound care management techniques as well as the amount of radiological contamination. On other occasions, sophisticated treatment available only at special medical facilities shall be required. As with any response function, training must be conducted before an accident.

C11.2. PURPOSE AND SCOPE

This chapter provides guidance on the medical requirements resulting from a nuclear weapon accident. Recommended procedures and available resources, their location, and how to get them are also discussed.

C11.3. SPECIFIC REQUIREMENTS

Medical personnel shall assist in accident-related emergency medical treatment. To do so, medical personnel shall be required to:

C11.3.1. Promptly treat accident casualties and injuries or illnesses, and arrange for disposition of fatalities.

C11.3.2. Assess and report the size of the accident, for example, numbers and categories of injuries, suspected contamination, and priority for transport to a medical facility.

C11.3.3. Advise medical facilities receiving casualties, in coordination with radiological personnel, of possible contamination and measures that may be taken to prevent its spread.

C11.3.4. Establish health and safety programs to support response operations over an extended period of time.

C11.3.5. Implement the collection of bioassay samples from personnel who were in the area and response personnel and ensure that bioassay and external exposure data become part of the health records.

C11.3.6. Establish a heat and/or cold exposure prevention program and other environmental prevention measure programs.

C11.3.7. Assist in casualty decontamination.

C11.3.8. Manage remediation of internal contamination.

C11.3.9. Help get and maintain radiation health history of all personnel involved in accident response, including civilians in the surrounding community exposed to radiation or contamination because of the accident.

C11.3.10. Record and track all information germane to personnel, evacuees, and casualties for hand-off to the RAMT or the MRAT for follow-up. RAMT policies and procedures are outlined in AR 40-13 (reference (af)).

C11.3.11. Update the OSC periodically on the extent and condition of casualties.

C11.4. <u>RESOURCES</u>

Medical support assistance, specializing in radiological health matters, is available from the Department of Defense and the DOE/NNSA through the DoD JNACC. Although many resources are available, all may not be required for response to a given accident. Resources discussed in Chapter 2 should be studied and reviewed in advance. When an accident occurs, assets should be requested when needed.

C11.4.1 <u>IRF</u>. The IRF shall have a medical element. The medical element shall be a medical officer trained in radiological health matters.

C11.4.2 <u>RTF</u>. The RTF medical officer shall assess the medical requirements and ensure that adequate medical resources are available.

C11.5. CONCEPT OF OPERATIONS

Medical problems resulting from a nuclear weapon accident vary in complexity depending primarily on the presence, or absence, of radioactive contamination. Other factors, such as a delayed initial response time (that is, a remote accident) or nonavailability of medical personnel, may add to the difficulty of proper medical response. This concept of operations is directed toward the medical response function and is applicable to both DoD and DOE/NNSA response force personnel. DoD medical personnel shall refer to reference (ae), as necessary.

C11.5.1. Pre-Accident Preparation. Before an accident occurs, the response force's medical officer, supporting medical personnel, and necessary equipment should be identified. When the Department of Defense is the LFA, the IRF is equipped and staffed to provide emergency medical treatment, while the RTF should be equipped and staffed to support a long-term response. When the DOE/NNSA is the LFA, the REAC/TS' response role includes providing emergency medical treatment with DoD medical resources. The proximity of existing medical treatment facilities to the accident site is a factor in determining the size and capabilities of the medical support element actually deployed. All medical personnel at the accident site shall be trained on the hazards and procedures for treating radiation accident victims. In addition to radioactive materials, several other weapon-specific substances may be present that are toxic hazards to personnel. Of primary concern are beryllium, lithium, lead, and smoke or fumes from various plastics. A discussion of the general characteristics, hazards, and health considerations associated with these substances is presented in Appendix 14.

C11.5.2. Emergency Rescue and Treatment. Rescuing and treating casualties is a high priority at any accident. The likelihood of response force involvement in the initial rescue and treatment procedures depends on response time. The longer it takes to get to the accident, the greater the likelihood that casualties shall have been treated and removed by civilian authorities. If possible, EOD personnel and/or radiation monitors should mark a clear path, or accompany emergency medical personnel into the accident site to help avoid radioactive, explosive, and toxic hazards. However, weapon render safe operations may prevent EOD personnel from accompanying medical personnel into the accident site. Emergency medical personnel shall wear protective clothing, appropriate for the medical risk to the patient and the radiological risk to the provider. Respiratory protective devices shall be worn based on the nonradiological hazards (smoke or fumes) when entering the accident area. Respiratory protection should not be required when treating patients outside the contaminated area, but patients' clothing should be removed and handled carefully. Suggested casualty handling procedures for emergency response to a nuclear weapon accident include:

C11.5.2.1. Assess and assure an open airway, breathing, and circulation of the victims. Administer cardiopulmonary resuscitation, if necessary, using a bag-mask, positive pressure ventilator, or mouth-to-mouth resuscitation.

C11.5.2.2. Move victims, if possible, away from the contaminated area. Take routine precautions. Do not delay customary lifesaving procedures (drugs, Military Anti-Shock trousers, etc.) because of radiological contamination.

C11.5.2.3. Administer intravenous (IV) fluids, as necessary. Prophylactic IVs are not recommended.

C11.5.2.4. Control hemorrhaging and stabilize fractures.

C11.5.2.5. If a victim is unconscious, consider medical or toxic causes, since radiation exposure does not cause unconsciousness or immediate visible signs of injury.

C11.5.2.6. Triage or sort the casualties by priority of life- or limb-threatening injury. The on-site medical team, should use categories for emergent or immediate evacuation, delayed and dead.

C11.5.2.7. After the immediate medical needs are met, coordinate with appropriate radiological response personnel to monitor the victims for possible contamination before transporting to the hospital. Note and record the location and extent (in Counts per Minute (CPM)) of the contamination, and the instrument used, on a field medical card, then place this card in a plastic bag and attach to the patient's protective mask or in another fashion that prevents loss. Also, ensure that open wounds are covered with a field dressing to keep out contamination if the wound is uncontaminated or to contain the contamination if the wound is contaminated. Removal of contaminated clothing is advisable if the medical authority decides that its removal is not contra-indicated. Clothing should be carefully cut, not torn, and rolled to keep the outside of clothing away from the skin. Finally, wrap the patient in a clean sheet to contain any loose contamination during evacuation. Casualty decontamination, particularly wound decontamination, of seriously injured patients is best performed in a medical treatment facility.

C11.5.2.8. Determine if corrosive materials were present at the accident scene, since these materials may cause chemical burns. Take all possible precautions to prevent introduction of contaminated materials into the mouth.

C11.5.2.9. No medical personnel or equipment should leave the contaminated area without monitoring for contamination; however, transporting the seriously injured victim should not be delayed for monitoring or decontamination.

C11.5.2.10. Attendant medical personnel shall then process the patients through the CCL. As long as the patient stays wrapped in the sheet, he or she does not pose a threat of spreading contamination and compromising the CCL. Hence, these patients should be evacuated without decontamination. The patient shall then be transferred to the "clean" side of the hot line and placed in the charge of "clean" medical personnel residing on the uncontaminated side of the CCL. The patient may then be loaded into the ambulance or evacuation vehicle and be transported to the receiving medical facility.

C11.5.2.10.1. The procedures listed in subparagraphs C11.5.2.11.3. through C11.5.2.11.5., below, may be determined en route to the medical facility if radiation detection

instruments are available, but not at the expense of medical care. Consider using a single medical facility for contaminated casualties if a facility has sufficient capacity.

C11.5.2.11. To ensure that the receiving facility is prepared for the arrival of the victims, notify the facility of the following:

C11.5.2.11.1. Number of victims.

C11.5.2.11.2. Types or nature of injuries, vital signs, and triage category.

C11.5.2.11.3. Extent of contamination, if known.

C11.5.2.11.4. Areas of highest contamination.

C11.5.2.11.5. Any suspicion of internal contamination.

C11.5.2.11.6. The radionuclide and the chemical form, if known, and by what instrument it was measured.

C11.5.2.11.7. Any exposure to non-radiological toxic materials.

C11.5.2.12. On arrival at the hospital, take patients immediately to the area designated for receiving contaminated patients. If no such area exists, then take the patients to the emergency room. Before the patient enters the hospital, attendant medical personnel shall ensure that the hospital has instituted the proper precautions. These precautions include, but are not limited to:

C11.5.2.12.1. Covering the area with butcher paper, plastic sheeting, or absorbent-lined plastic diapers to contain loose contamination. Tape seams to prevent trip hazards.

C11.5.2.12.2. Ensuring that personnel have the appropriate radiation detection instrumentation, i.e., alpha scintillation detectors or GM counters with pancake probes, and that they are versed in the use of this equipment.

C11.5.2.12.3. Ensuring personnel are wearing proper protective clothing. For this type of accident scenario, surgical gowns, gloves, shoe covers, and masks, should be appropriate protection against contamination.

C11.5.2.13. The decontamination of the patients may then begin. An autopsy table is a very suitable decontamination platform. These measures include:

C11.5.2.13.1. Carefully opening the sheet or blanket, wrapping around the patient avoiding spreading any contamination.

C11.5.2.13.2. Removing clothing by cutting away the sleeves and trouser legs and folding the contamination in on itself. This method parallels the standard methods of removing

patient clothing in an NBC environment. These articles of clothing shall then be bagged to contain the contamination. Removing contaminated clothing may remove up to 90 percent of the contamination.

C11.5.2.13.3. Remaining contamination may be located with the use of monitoring equipment and then removed by washing with warm soap and water. Several washings may be required, but do not expect decontamination to be 100 percent effective. Suspect areas include the hair, face and neck, and hands, as well as other exposed areas of the body due to injuries or torn clothing. Hair is extremely difficult to decontaminate because of its oil content. All contaminated hair should be clipped and properly disposed of.

C11.5.2.13.4. Except in lifesaving emergencies, the ambulance or evacuation vehicle shall not be returned to normal service until it is monitored and decontaminated and such efforts have been confirmed by attending radiological monitors.

C11.5.3. <u>Liaison with Civil Authorities</u>. Emergency evacuation of contaminated casualties may have occurred before response force personnel arrived at an off-base accident. Additionally, some response force personnel may have arrived from the contaminated area before appropriate controls were implemented; if so, follow-on responders must liaise with area medical facilities to ensure that proper procedures are taken to prevent the spread of contamination. It must be determined if local medical facilities are able to monitor and decontaminate their facilities or if assistance is required. The following procedures may be used by medical facilities not prepared for radiological emergencies to reduce the spread of contamination:

C11.5.3.1. Use rooms with an isolated air supply, if possible.

C11.5.3.2. Use scrub clothes, shoe covers, and rubber gloves, and bag them and any other clothing, sheets, or materials that may have come in contact with the patient when leaving the room.

C11.5.3.3. Get radiation monitoring assistance for detecting alpha emitters.

C11.5.3.4. Use plastic sheeting on floors to ease decontamination and cleanup.

C11.5.3.5. Use isolation-control procedures.

C11.5.4. <u>Processing of Fatalities</u>. The remains of deceased accident victims should, in general, be treated with the same respect and procedures used in any accident; however, all fatalities must be monitored for contamination, and decontaminated if necessary, before release for burial. The determination of whether decontamination is to be done before an autopsy should be made by the examining authorities. Any radiological support for autopsies should be arranged on a case-by-case basis. Service procedures for handling casualties are in AR 600-8-1; Air Force Instruction (AFI) 36-3002; and Naval Military Personnel Manual, Article 1770-010 (references (ag) through (ai)). Civil authorities must be notified of any civilian casualties as quickly as possible, and if required, help identify the deceased before decontamination.

Additional technical guidance on handling radioactively contaminated fatalities may be found in the National Council on Radiation Protection and Measurements Report, Number 65; Joint Pub 4-06; and U.S. DHS, "Working Group on Radiological Dispersal Device (RDD) Preparedness, Medical Preparedness and Response Sub-Group" (references (aj) through (al)).

C11.5.5. Medical Clearing Facility. A medical clearing facility should be established near the CCS with supplies for medical treatment of response force injuries and to assist in decontamination. Minimum response force medical staffing after the initial emergency response should include a medic with a physician and health physicist, on call. If an injury occurs within the RCA, and if injuries allow, the injured person should be brought to the CCS and clearing facility by personnel and vehicles already in the area. A separate first aid station may be needed to support the base camp.

C11.5.6. Collection of Bioassay Samples. Bioassay programs and techniques are discussed in Appendix 8. Medical personnel usually collect required biosamples from response force personnel. Procedures for collecting and marking samples should be coordinated with the ASHG. The ASHG shall also guide where samples should be sent for analysis. Depending on Service procedures, urine and fecal samples may be required of all personnel who enter the RCA or of those suspected to have internalized radioactive material.

C11.5.7. Hot and/or Cold Weather Operational Conditions

C11.5.7.1. The reduction in natural cooling of the body caused by wearing full personal protective clothing with hoods and respirators increases the likelihood of heat injuries. Heat injuries (stroke, exhaustion, or cramps) may occur with the ambient air temperature as low as 70 °F when wearing full protective gear. Preventive measures to reduce heat injuries include acclimatization, proper intake of salt and water, avoiding predisposing factors to heat illness, monitoring temperatures, scheduling adequate rest or cooling periods, and educating the work force on heat injury symptoms and remedial actions. Adequate water intake is the single most important factor in avoiding heat injuries. Frequent drinks are more effective than the same quantity of water taken all at once. Table C11.T1., below, provides information necessary to estimate recommended work-rest cycles and fluid replacement cycles for various environmental conditions (using the Wet Bulb Globe Temperature (WBGT) Index), clothing levels, and work intensities. The work-rest cycles specified in the table are based on keeping the risk of heat casualties below 5 percent. Under some operational conditions, work-rest cycles offer no advantage to continuous work (see No Limit (NL)) entries in table C11.T1. Use the information in table C11.T1. and guidance provided by the medical staff to estimate work-rest cycles and fluid replacement requirements.

Table C11.T1. Work-Rest Cycles and Fluid Replacement Guidelines

Heat Category	**WBGT Index ºF**	**Light (Easy) Work**		**Moderate Work**		**Hard (Heavy Work)**	
		Work /Rest	**Water Intake (Quart/hr)**	**Work/ Rest**	**Water Intake (Quart/hr)**	**Work/ Rest**	**Water Intake (Quart/hr)**
1	78-81.9	NL	1/2	NL	3/4	40/20 min	3/4

2 (Green)	82-84.9	NL	1/2	50/10 min	3/4	30/30 min	1
3 (Yellow)	85-87.9	NL	3/4	40/20 min	3/4	30/30 min	1
4 (Red)	88-89.9	NL	3/4	30/30 min	3/4	20/40 min	1
5 (Black)	>90	50/10 min	1	20/40 min	1	10/50 min	1

1. If wearing Mission Oriented Protective Posture 4, add 10ºF to WBGT.
2. If wearing personal body armor, add 5ºF to WBGT in humid climates.
3. Daily fluid intake should not exceed 12 quarts.
4. Caution: Hourly fluid intake should not exceed one quart.
5. Rest means minimal physical activity (sitting or standing), accomplished in shade if possible.
6. NL=no limit to work time per hour.
7. The work/rest time and fluid replacement volumes shall sustain performance and hydration for at least 4 hours of work in the specified work category. Individual water needs shall vary ±1/4 qt/hr.

C11.5.7.2. Specialized personnel cooling equipment (for example, cooling vest) should be used to allow additional stay-time for personnel in extreme heat conditions.

C11.5.7.3. The use of cold weather gear, personal protective clothing, and respiratory equipment presents severe demands on personnel. Personnel must be monitored closely to prevent frostbite and other cold weather effects.

C11.5.8. Public Affairs Considerations. All medical staff personnel should be aware of the sensitive nature of issues surrounding a nuclear weapon accident. All public release of information should be approved by the OSC and coordinated with the JIC/CIB as discussed in Chapter 14. Medical personnel should ensure that public affairs personnel are informed of medical information provided to medical facilities receiving potentially contaminated patients. Hospitals shall provide medical information to the public and the news media in accordance with their policies. USG military and civilian responders should refer media and public queries for information to PA personnel.

C11.5.9. Base Camp Medical Support. Base camp support requirements include treating on-the-job injuries and sickness, inspecting field billeting and messing facilities, evaluating the adequacy of restroom facilities and sewage disposal, and supplying water. Personnel suffering cuts or open sores should be prohibited from entering the contaminated area until the wound is properly protected to exclude possible contamination. Their supervisors should be notified of the restriction.

C12. CHAPTER 12

SECURITY

C12.1. GENERAL

The presence of nuclear weapons or weapon components at an accident site requires implementation of an effective security program as soon as possible. Off installation accidents might require establishing an NDA/NSA to allow control of civilian land by military forces. Even after establishment of the NDA/NSA, close coordination with civil law enforcement agencies is essential to an effective security program. The equivalent DOE/NNSA area for an accident involving DOE/NNSA equipment and/or materials is an NSA.

C12.2. PURPOSE AND SCOPE

This chapter provides guidance for planning and conducting security operations at the scene of a nuclear weapon accident in U.S. territory and discusses security requirements thereto. Also, the chapter outlines a concept of operations to satisfy these requirements.

C12.3. SPECIFIC REQUIREMENTS

The security program must allow for situational awareness both inside and outside the bounds of the NDA/NSA. This situational awareness shall likely require an intelligence and/or counter-intelligence element to be part of the program to liaise with local, state, and Federal Agencies and provide necessary guidance to the OSC. The security program at the accident scene should:

C12.3.1. Provide effective control of the accident area.

C12.3.2. Protect nuclear weapons, weapon components, and other classified Government-owned material.

C12.3.3. Maintain a Security Control Center.

C12.3.4. Provide necessary physical, operational, and informational security and recommend security measures to the OSC.

C12.3.5. Ensure a secure perimeter for the NDA/NSA. (More than one NDA/NSA may be established, as required.)

C12.3.6. Place the NDA, NSA, or Security Area perimeter outside of the fragmentation zone. Coordinate with the ASHG and EOD personnel to determine the required radius.

C12.3.7. Establish an ECP, as directed by the OSC. If necessary, multiple ECPs may be used but should be reduced to the fewest necessary to conduct the operation.

C12.3.8. Establish a standardized entry control system to the RA. This shall include implementing and using an identification and/or badging system, entry control logs, and a record of all personnel entering the accident areas that shall be transferred to the historian when no longer needed (as defined by the OSC).

C12.3.9. Have a security element for perimeter security, entry and exit control, and protection of classified information and property. The OSC should carefully review with the PLA the RUF to be used by all security personnel responding to the accident and should ensure that the applicable RUF are fully understood by those personnel.

C12.3.10. If necessary, establish a security response force.

C12.3.11. Protect radiological materials, weapons and components, other classified materials and information, and Government property.

C12.3.12. In case of further emergency responses into the NDA, develop procedures that ensure immediate access by fire and medical responders, and the coroner for processing fatalities.

C12.3.13. Provide for special, independently secured areas within the NDA/NSA, for discussing CNWDI, Top Secret, Sensitive Compartmented Information, or other restricted information. Depending on need and frequency of use, a single area may be used.

C12.3.14. Provide special areas that are independently secured, for storing classified documents, recovered nuclear weapons, weapon components, weapon residue, and other radiological materials.

C12.3.15. As required, debrief personnel with access to classified information.

C12.3.16. Coordinate security actions with State and local officials.

C12.3.17. Review with the PLA the deadly force provisions of the RUF to ensure that they comply with DoD Directive 5210.56 and DoD C-5210.41-M (references (am) and (an)).

C12.3.18. Coordinate with the PLA to ensure that actions of military security personnel do not violate the Posse Comitatus Act (Section 1385 of title 18, United States Code (U.S.C.) (reference (ao)), while allowing for the implementation of force protection initiatives.

C12.3.19. Notify the FCO and the FRMAC of personnel apprehended within the NDA or NSA.

C12.3.20. Notify the OSC, the ASHG, the JOC, and the Legal element of personnel apprehended inside the NDA, NSA, or Security Area.

C12.3.21. Coordinate with the ASHG to determine procedures for handling unprotected personnel and human remains encountered in contaminated areas within the NDA/NSA.

C12.3.22. Arrange for turnover of apprehended individuals to local law enforcement or the FBI, as applicable.

C12.3.23. Provide an intelligence function.

C12.3.24. Provide advice and assistance in counterintelligence to the OSC staff. Counter potential terrorist and/or radical group activities or intelligence collection efforts.

C12.3.25. Provide a liaison to and coordinate with Federal, State, and local law enforcement and security agencies on threats to response organizations and operations.

C12.3.26. Coordinate and advise the OSC and security staff on OPSEC matters.

C12.3.27. Investigate and report incidents of immediate security interest to the OSC and the security staff, in cooperation with the FBI.

C12.3.28. Advise and assist the OSC and the security staff on matters of personnel and information security.

C12.3.29. Coordinate requests for photographic coverage of the accident site with the PLA and the PAO.

C12.3.30. When appropriate, coordinate disestablishment of the NDA, or NSA with State or local governments.

C12.4. RESOURCES

C12.4.1. Department of Defense Resources

C12.4.1.1. IRF. The IRF shall have a security element for perimeter security, entry and exit control, and protection of classified information and property. Since sufficient personnel are not likely to be included in the IRF security elements responding to a nuclear weapon accident, supplementation may be required. Security forces may expect to encounter large numbers of people attracted to the accident scene, and care should be exercised to ensure that only experienced security personnel are in supervisory positions. Installations with a nuclear weapon capability should maintain equipment to control an accident site. This requirement should include rope and stanchions for delineating the boundary of the accident site, NDA/NSA and ECP signs, and portable lights. The IRF should provide security personnel with anti-contamination clothing and protective masks in the event that security requires their presence within the RCA. Riot control gear should be available if crowd control is required. Security

personnel shall be armed and equipped in accordance with reference (an) requirements. Special consideration should be given to ensure personal protective gear is issued to first responders.

C12.4.1.2. RTF. The RTF Senior Security Representative should assess workforce requirements and ensure that sufficient additional security personnel are included in the RTF. IRF security personnel may become part of the RTF security element. The Senior Security Representative should be prepared to meet all security requirements on a 24-hour basis without degrading the alertness and capability of his or her personnel to respond.

C12.4.2. DOE/NNSA Resources. When the DOE/NNSA is the LFA, specific requirements previously outlined in section C12.3., above, apply. Under DOE policy, the DOE/NNSA provides a security element for perimeter security, entry and exit control, and protection of classified information and property. Civilian law enforcement may supplement DOE/NNSA security personnel, if requested.

C12.4.3. Civilian Response. Civilian law enforcement response depends on the location of the accident site. If the accident occurs off a military installation near a populated area, local police, fire, and rescue units shall be notified and may be on scene when the IRF or the DOE/NNSA OSC arrives. Civilian law enforcement personnel may supplement military and/or DOE/NNSA security personnel, if requested.

C12.5. CONCEPT OF OPERATIONS

C12.5.1. Accident Assessment. Once at the accident site, the Senior Security Representative must assess the situation. This assessment includes an evaluation of ongoing emergency response operations and actions of local law enforcement agencies, and provides the foundation for the security program. While the assessment is made, security should be established at the accident site in cooperation with civil authorities. Fragmentation hazard distances and the possibility of contamination should be considered when posting initial security personnel around the scene. This initial security should not be confused with the NDA/NSA which may not yet be established and may be different in size. The Senior Security Representatives should consider the following elements in their assessment:

C12.5.1.1. Threat (real and potential danger to the secure area).

C12.5.1.2. Location (on or off installation).

C12.5.1.3. Demographics and accident environment (remote, rural, suburban, and urban).

C12.5.1.4. Terrain characteristics (critical or dominating features).

C12.5.1.5. Contamination (radiation intensity and extent and other HAZMATs).

C12.5.1.6. Accident hazards (HEs, rocket motors, or toxic chemicals).

C12.5.1.7. Local meteorological conditions (include speed and direction of prevailing winds).

C12.5.1.8. Transportation network in accident area key avenues of approach (access routes, types, and quantities of vehicles).

C12.5.1.9. Structures in accident area (type and quantity).

C12.5.1.10. Safety of security personnel (fragmentation distances, contamination, and cold and/or hot weather).

C12.5.1.11. Presence of casualties or fatalities.

C12.5.2. NDA/NSA

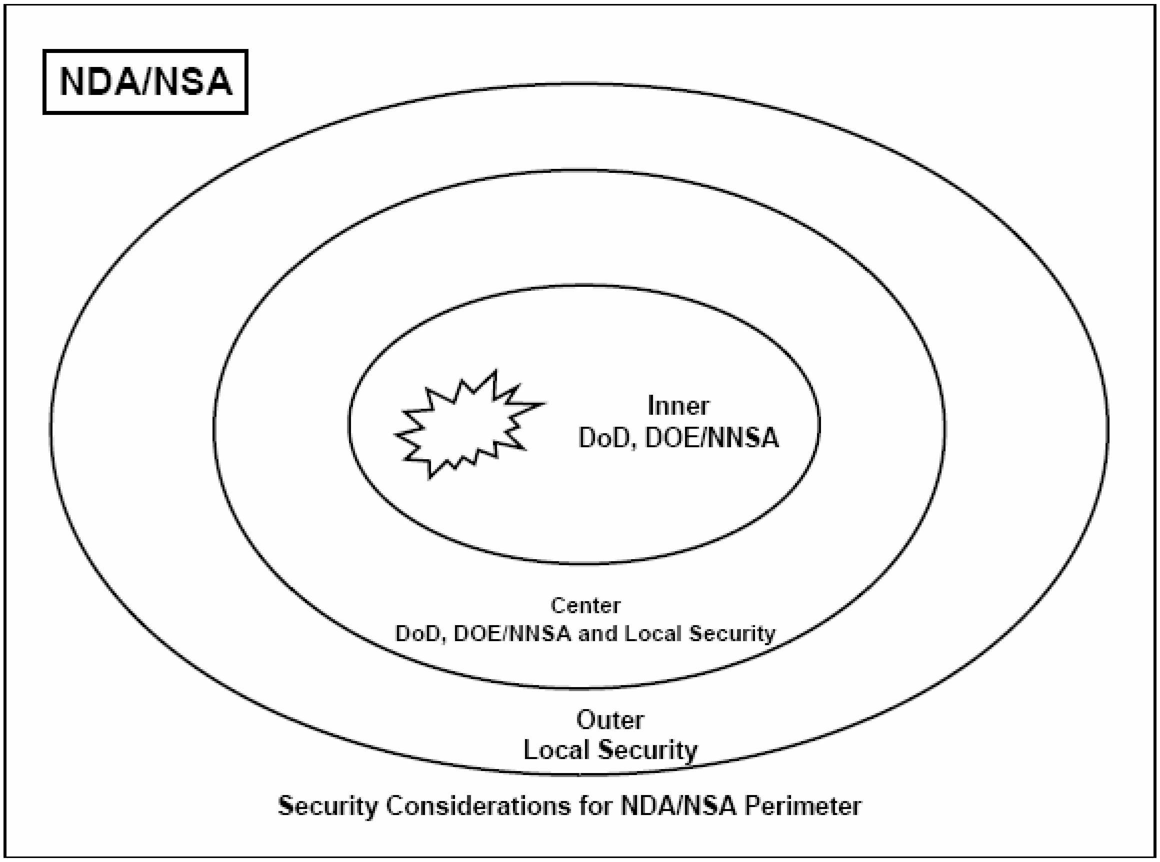
C12.5.2.1. An NDA/NSA may be required any time an accident involving nuclear weapons or components occurs on non-Federal property. The NDA/NSA, which usually is initially conterminous with the fragmentation zone for the pertinent weapon, should be determined after consultation with the PLA. Security of any part of the area contaminated by radiation existing outside the NDA/NSA is a matter of public safety and should be provided by civilian authorities and/or officials; however, military assistance may be requested. (To complement security for an NDA/NSA, consider the following concept: Military only, control the actual NDA/NSA perimeter. Extending out, another perimeter is staffed by military and civilian law enforcement. Out further, another perimeter is staffed by civilian law enforcement. This concept allows for two perimeters with law enforcement personnel to contain and/or control the civilian population before gaining access to the actual security area. This concept is shown in figure C12.F1.)

C12.5.2.2. The Internal Security Act of 1950 (Section 831 of title 50, U.S.C. (reference (ap)) provides the basis for establishing an NDA/NSA only in the United States. For a DoD-led response, reference (w) should also be consulted when establishing an NDA/NSA. For a DOE/NNSA-led response, see subsection 162(i) of the AEA of 1954 as amended (section 2201 of reference (h)). An NDA/NSA is established specifically to enhance safeguarding Government-owned property located on non-Federal land. Senior DoD or DOE/NNSA representatives may designate an NDA/NSA, and then only to safeguard Government resources, irrespective of other factors. The OSC should seek legal advice on any decisions about establishing, disestablishing, or modifying the NDA/NSA.

C12.5.2.3. The OSC designating the NDA/NSA must ensure its boundaries are clearly defined and marked. Area boundaries are established to reduce interference with other lawful activities and uses of the property. Initially, the dimensions of the NDA/NSA may be quite large, which is necessary until more specific information is available on the location of the Government-owned material. The boundary is defined by some form of temporary barrier, for example, rope and wire. Warning signs as described in reference (an), should be posted at the

entry control station and along the boundary and be visible from any direction of approach. In areas where languages other than English are spoken, bilingual signs should be considered.

Figure C12.F1. Security Concept



C12.5.2.4. Once the NDA/NSA has been established, the OSC must determine whether overflight restrictions are necessary to ensure the security and safety of the area. If so, a request should be made to the Air Traffic Control Center responsible for the geographic area in which the NDA/NSA is located. The physical dimensions of the RA must be reasonable while affording the security and safety the OSC seeks. The restrictions should be relaxed as conditions allow and removed as soon as practical.

C12.5.2.5. The OSC who establishes the NDA/NSA should advise civil authorities and/or officials of the authority and need for the NDA/NSA and the security controls in effect. If possible, the OSC should secure the landowners' consent and cooperation; however, getting such consent is not a prerequisite for establishing the NDA/NSA.

C12.5.2.6. In maintaining security of the NDA/NSA, personnel should use the minimum degree of control and force necessary, recognizing that the use of deadly force is authorized for protecting nuclear weapons. Sentries should be briefed thoroughly and given specific instructions for dealing with civilians and the applicable RUF. All personnel should be aware of the sensitive nature of issues surrounding an accident. Moreover, controls should be

implemented to ensure that public affairs policy is strictly adhered to, and that requests for interviews and queries about the accident are referred to public affairs personnel. Civilians should be treated courteously, and in a helpful but watchful manner. No one may remove anything or touch any suspicious objects. Special provisions should be made to provide unencumbered access by medical and health physics personnel treating casualties, and handling the deceased, within the security area.

C12.5.2.7. Local civil authorities and/or officials should be asked to help military personnel prevent unauthorized entry and remove unauthorized personnel who enter the NDA/NSA. Civilian authorities should usually apprehend or arrest civilian personnel who violate any security requirements at the NDA/NSA. If local civil authorities are unavailable, or refuse to give assistance, on-scene military personnel should detain violators or trespassers. Civilians detained by military security personnel should be turned over to civilian law enforcement as soon as possible and such detention should be brought to the attention of the PLA. The FCO should be notified of each detention and the actions taken. To avoid violating those conditions of section 831 of reference (ao) that may limit the use of DoD personnel in certain civilian law enforcement activities, the OSC should discuss with the PLA any actions that would appear to involve military personnel in law enforcement matters.

C12.5.2.8. When all Government resources have been located, the OSC should consider reducing the size of the NDA/NSA. When all classified Government resources have been removed, the NDA/NSA shall be disestablished. Early coordination with State and local officials allows an orderly transfer of responsibility to State and local agencies when reducing or disestablishing the NDA/NSA.

C12.5.3. Security Procedures

C12.5.3.1. Sentry posts around the NDA/NSA should be in locations that enable guards to maintain good visual contact. This action prevents unauthorized persons from entering the NDA/NSA undetected between posts. Lighting should be provided, night vision equipment supplied, or guard spacing adjusted, to ensure that visual contact is maintained at night. Each guard should have a means of summoning assistance, preferably a radio, or be in contact with someone who does. Consider getting portable intrusion detection system sensors. This type of equipment shall reduce security personnel requirements and the possibility of radiation exposure to them.

C12.5.3.2. During the initial emergency response, entry and exit of emergency units and other personnel may be largely uncontrolled. The Senior Security Representative should recognize that during initial response, necessary lifesaving, fire suppression, and other emergency activities may temporarily take priority over security procedures; however, as response operations progress, standard security measures specified in DoD Directive 5210.41, DOE Order 470.1, DOE Order 474.1A, and DOE Manual 474.1-1A (references (aq) through (at)) must be enforced. As soon as possible, an ECP should be established. When personnel from various Federal and/or civilian authorities and/or agencies arrive at the entry control point, leaders of the groups should be escorted to the operations center. An identification and badging

system should be implemented, entry control logs established, and a record of all personnel entering or exiting the accident area made and kept by the OSC's security personnel.

C12.5.3.3. A JSCC or control point should be established as the focal point for security operations and be located close to the ECP. Its location should be fixed so that personnel become familiar with the location. Representatives of all participating law enforcement agencies should be at the security operations center and be able to communicate with their personnel.

C12.5.3.4. A security response force should be considered, although early in the accident response, sufficient personnel may be unavailable to form such a force.

C12.5.4. <u>Security Considerations</u>

C12.5.4.1. Some components in nuclear weapons may reveal classified information by their shape, form, or outline. Specified classified components must be protected from sight and overhead photographic surveillance.

C12.5.4.2. Individuals with varying degrees of knowledge and appreciation for security requirements shall assist in response operations. For a DoD-led response, a comprehensive and effective information security program is available as outlined in DoD 5200.1-R (reference (au)), and should be issued in coordination with the SEO. For a DOE/NNSA-led response, the DOE/NNSA OSC should consult DOE Order 471.2A (reference (av)). The content of the information security program should be briefed to everyone in the weapon recovery effort.

C12.5.4.3. CNWDI access verification may have to be waived temporarily during the initial phases of accident response. When the urgency of the initial response is over and order has been established, compliance with DoD, DOE/NNSA, and Service directives, regulations and/or instructions should prevail. For a DoD-led response, access procedures must be in compliance with DoD Directive 5210.2 (reference (aw)). For a DOE/NNSA-led response, access procedures must be in compliance with references (as) and (at).

C12.5.4.4. The two-person concept is addressed in DoD and Service directives, including reference (aq). Senior Security Representatives establish and enforce procedures to ensure only authorized personnel are granted access to the site areas that require two-person concept compliance.

C12.5.4.5. In the initial emergency response, PRP/PAP requirements may have to be waived due to a lack of PRP/PAP certified personnel, in accordance with DoD Directive 5210.42 and title 10, Code of Federal Regulations, Chapter 3, Part 711 (references (ax) and (ay)). When certified personnel are available, they should be used in security positions that require them. Security personnel assigned to directly guard nuclear weapons and nuclear components containing SNM must be PRP or PAP certified. PRP/PAP personnel should be used on the perimeter, if available.

C12.5.4.6. An area should be available within the security perimeter where EOD and DOE/NNSA personnel may discuss CNWDI related to weapon(s) recovery operations. Also,

areas shall be established for storing classified documents, recovered weapons, and weapon components. The Senior Security Representative must ensure that adequate security is provided for these areas.

C12.5.4.7. If a base camp is established to support the response operation, traffic control signs should be posted, law enforcement procedures developed, and a base camp ECP established. Verification of vehicle trip authorization, restriction of curiosity seekers, access to the camp, and maintaining order and discipline within the camp may be parts of base camp security functions.

C12.5.5. Intelligence. Intelligence personnel should be used to the fullest extent and incorporated actively in the overall security posture, including, but not limited to:

C12.5.5.1. Advice and assistance in counterintelligence to the OSC and security staff.

C12.5.5.2. Liaison and coordination with Federal, State, and local agencies and civilian authorities and/or officials, on threats to response operations (for example, hostile intelligence collection efforts and terrorist activities).

C12.5.5.3. Coordination and advice to the OSC and security staff on operations security.

C12.5.5.4. Investigating and reporting incidents of immediate security interest to the OSC and the security staff (in cooperation with the local office of the FBI).

C12.5.5.5. Advise and assist the OSC and security staff on matters of personnel and information security necessary to maintain high standards of security.

C12.5.5.6. Receiving requests for large-scale photographic coverage of the accident site.

C13. CHAPTER 13

COMMUNICATIONS

C13.1. GENERAL

C13.1.1. Fast, reliable, and accurate communications are essential for nuclear weapon accident response operations. Moreover, securing adequate internal communications to support activities at the accident scene is a time sensitive operation. Equally critical to effective C2 is the timely establishment of external communications to higher levels, particularly in the Washington, D.C. area. The communications officers of the OSC must act immediately to ensure that appropriate communications equipment is identified and requested early in response operations. Information must be made accessible. In general, the value of information increases with the number of users.

C13.1.2. Effective response to a nuclear weapon accident relies heavily on a communications officer's knowledge of secure and non-secure tactical, strategic, and commercial communications systems. He or she must be able to apply conventional and imaginative methods and ensure that required communications are available. He or she should be equally adept at establishing communications support in remote locations or in areas near existing communications systems.

C13.1.3. DoD, DOE/NNSA, FEMA, State, and/or civilian officials shall all establish their own internal communications systems at the accident site and shall ensure that these systems are interoperable.

C13.2. PURPOSE AND SCOPE

This chapter provides guidance for establishing communications systems and capabilities to support response operations. The communication requirements of the OSC are discussed, including internal and/or external communications support for personnel at the accident scene. Also included are descriptions of communication systems hardware (e.g., telephone, radio, satellite, and visual signal) that are available to support operations.

C13.3. SPECIFIC REQUIREMENTS

The OSC requires internal communications with the operations center and forces in the field to control and keep abreast of response activities. External communications with higher levels of command are necessary to keep key personnel informed. Many initial communications requirements may be met by unsecure voice communications; however, both secure voice and record communications are required early in the response period. Communication requirements:

C13.3.1. Establish the following communications capabilities internal to the accident site:

C13.3.1.1. Telephone communications between fixed site locations, for example, the operations center and the JIC/CIB.

C13.3.1.2. Field communications for EOD operations. Secure communications are always necessary.

C13.3.1.3. Wireless Communications. Provide secure wireless nets such as UHF/VHF nets for command, weapons recovery operations, radiological operations, security, and public affairs.

C13.3.1.4. Establish and assign radio call signs.

C13.3.1.5. Establish a local computer network or access to a local computer network. If possible, establish virtual C2 requiring password access. The computer network should be protected by an appropriate firewall and be able to access the Internet, accommodate e-mail, and ease document processing storage and retrieval.

C13.3.2. Establish the following external communications to higher HQ:

C13.3.2.1. The Department of Defense shall establish telephone communications with the Combatant Command's Operations Center, the Service Operations Center, the NMCC/JNAIRT, and the Office of the ASD(PA). DOE/NNSA actions shall include establishing telephone communications with the appropriate operations offices and the DOE HQ/EOC. Conferencing may suffice early in the response.

C13.3.2.2. Multiple secure and non-secure telephone lines to support response force elements. The telephone network should be sized to insure an adequate ability to handle the expected volume of traffic. The communications officer should consider programming the serving telephone switch or switches to increase the likelihood of call completion. Hunt groups should be considered and features such as call roll over and voice mail enabled where appropriate. DSN access must be considered.

C13.3.2.3. Secure voice through satellite, telephone, or high frequency (HF). Often using Secure Telephone Unit (STU) IIIs and Secure Terminal Equipment shall be the most practical and immediate method of establishing secure voice.

C13.3.2.4. Access is required to the Defense Information System Network for record communications from remote locations.

C13.3.2.5. <u>Internet access</u>. The requirement to send and receive large data size documents and images between command authorities is probable. Therefore, Internet access should be as robust as practical. The communications officer should strive to provision bandwidth at 128Kbps or higher. SECRET Internet Protocol Router Network access is always desirable.

C13.3.3. Coordinate frequency usage with all response organizations and with the NCS representative to prevent interference and radio operations in areas where electromagnetic emissions may create explosive hazards or affect electronic and field laboratory instruments. Get frequency clearances, as necessary.

C13.3.4. Prepare a Signal Operating Instruction (SOI) guide for use by all response organizations.

C13.3.5. If required, request Chairman, Joint Chiefs of Staff, deployable communications assets.

C13.3.6. If required, get leased commercial communications.

C13.4. RESOURCES

Communications capabilities and resources for nuclear weapon accident recovery operations vary widely. Resources are as familiar as the telephone or as sophisticated as satellite capable secure voice radio. Communications assets must be able to deploy to, and operation in, remote locations. This section briefly describes a variety of communication resources for response organizations. Because the same equipment supports many contingencies, only those assets required for a specific nuclear weapon accident response effort should be requested. Resources are available from the Department of Defense, other Federal organizations, or commercial sources.

C13.4.1. Service Assets. The Military Services maintain communications assets organic to combat support units and for contingency assets. Information about specific assets, as well as procedures for requesting and tasking Service assets, may be obtained from the respective Service operations centers or operational commanders. Service assets may be obtained by contacting the individual Service Operations Center listed in paragraph C2.2.1.

C13.4.1.1. U.S. Army. U.S. Army Signal organizations are designed to support deployed forces from the theater Army level down to the smallest unit. Major communications support includes C2, C2 and communications, and automation systems. Essential elements of these areas include long haul transmission systems (Super High Frequency and UHF satellite terminals), voice (Mobile Subscriber Equipment and Tri-Service Tactical (TRI-TAC) Voice Switches), record communications traffic (e.g., TRI-TAC Message Switches), Frequency Modulation (FM) and HF radio systems (e.g., SINCGARS), and data communications networks.

C13.4.1.2. USAF. Tactical communications assets are available from both the Combat Communication Groups and HAMMER ACE. HAMMER ACE is a rapidly deployable team with military and commercial off-the-shelf technology communications equipment. The mission of HAMMER ACE is to provide initial secure C2 communications.

C13.4.1.3. U.S. Navy. The Joint Maritime Operations Command Center, Mobile Integrated Command Facility, and the Mobile Ashore Support Terminal comprise the U.S.

Navy's Joint Maritime Command Information System, the U.S. Navy's tactical ashore communications capability. These systems were fielded to replace the Ashore Mobile Contingency Communication System. Although these capabilities primarily support the naval component commander of a Combatant Command or Joint Task Force, their modular organization makes these systems ideally suited for use with liaison teams or in support of contingency requirements.

C13.4.1.4. U.S. Marine Corps. Present Marine Corps C2, communications, computers, and intelligence systems mix some analog transmission equipment with digital transmission and switching equipment that is compatible with TRI-TAC. During contingency operations, and if approved by the supported Combatant Commander, the Marine Air Ground Task Force HQ may extend Defense Information Infrastructure (DII) common users services (Internet Protocol Router, DSN, Secure Voice Systems, Defense Messaging System/Automatic Digital Network) through a DII entry point by way of a Ground Mobile Force satellite link.

C13.4.2. Joint Chiefs of Staff Controlled Assets. Joint Chiefs of Staff contingency support communications resources are requested according to procedures in Chairman of the Joint Chiefs of Staff Instruction 6110.01A (reference (az)). Additional information on these assets may be obtained from the Joint Staff Contingency Support Division.

C13.4.3. DOE/NNSA Assets. The DOE/NNSA maintains emergency response, air transportable communications services, and hardware. Systems include a multi-point telephone switch, fax, HF/VHF radio networks (with pagers), video teleconferencing, and terrestrial microwave system. A multi-channel satellite system is available to provide long-haul transmission capability. Single-channel INMARSAT terminals, with data interface, are included for advance party use and emergency backup. Secure communications include voice, fax, still and full motion video, and data. Field communications are listed into the DOE/NNSA ECN through satellite. DOE/NNSA assets may be obtained through the DOE HQ/EOC (see paragraph C2.2.2.).

C13.4.4. FEMA Assets. Deployable communication assets used by FEMA response groups are maintained at the FEMA regional office level. Although the specific equipment varies between FEMA regions, the FEMA response contingent usually arrives with the following capabilities:

C13.4.4.1. HF radio (voice only) for external communication to their regional office, the State Disaster Response HQ, and the National Interagency Operations Center in Washington, D.C.

C13.4.4.2. VHF radio to support on-scene DFO Federal Response Center (internal) communications. Equipment includes hand-held radios, a suitcase repeater, and a suitcase base station with telephone interconnect. The quantities of these assets shall vary depending on the size of the FEMA response contingent.

C13.4.5. Commercial Assets. In the CONUS, acquisition of supporting communications systems from commercial carriers (for example, American Telephone and Telegraph) is possible.

Commercial carriers may provide communications to a remote area by transportable microwave, carrier systems, or cable. Leased services, including telephone, data Teletypewriter Exchange, Telephone Exchange, and Wide Area Telephone Service (WATS), are available in most locations.

C13.5. CONCEPT OF OPERATIONS

Nuclear weapon accidents present a variety of technical, logistical, and operational communications problems. Several factors, including the location of the accident, the response force involved, and the C2 arrangements of those forces, contribute to the complexity of the problems. This concept of operations focuses on the actions of the military response force(s) communications officer(s) and the DOE/NNSA communications personnel. The approach is to present items of concern sequentially regardless whether the IRF, RTF, or DOE/NNSA communications officer takes the action. The RTF communications officer shall find out what has been accomplished before arrival and carry on from that juncture.

C13.5.1. Initial Actions. The initial task of the response force communications officer is to determine the communications assets at, or close to, the accident site. The local telephone company, State and/or local officials, or civilian authorities may provide information on the communication infrastructure near the accident scene and the capabilities for long haul and local communications. Once existing capabilities are determined, the communications officer should use these resources with deployed assets to establish an effective communications network.

C13.5.1.1. In remote or sparsely populated areas, the initial communication capability may consist of only hand-held, short-range VHF/FM radios, portable HF radios, or wire (field phones). Conversely, if an accident occurs close to a populated area, a coin-operated telephone, or even a business or private telephone may be available immediately for emergency use. In either case, additional leased communications such as WATS may be obtained to supplement available communications. Because more time is required to provide leased assets to remote areas, the requirements must be identified and requested at the earliest possible time. Follow-on deployment of mobile communications provides the response force with additional local telephone and radio, as well as long haul secure voice and record capabilities.

C13.5.1.2. Another method of communications for external (long haul) communications, particularly if assets are limited, is the telephone conferencing capability of the Service operations centers, the NMCC, and the DOE/NNSA HQ/EOC. Further, if communication may be established from the site to the DoD JNACC and the Albuquerque Operations Center, the DoD JNACC or the Albuquerque Operations Center shall assist by relaying information or coordinating with other forces and/or Agencies. When requested, the DoD JNACC arranges for transportation of specialized communications resources.

C13.5.1.3. The OSC may spend considerable time away from the Command Post. The response force communications officer must, therefore, plan communication methods to support the mobility of the OSC. Radio nets provided for OSC communications should have sufficient range and be capable of frequent use. If possible, the net should be secure and have a radio

and/or wire integration capability into the local switchboard and long haul voice circuits. The staff directors for support and operations and the special staff advisors should be included in this net.

C13.5.1.4. The communications officer must take prompt action to get frequency clearances. Radio frequencies are managed at the national level by the Military Communications-Electronics Board (Joint Frequency Management Office). Each Service has membership on the board. Moreover, each Military Department has a frequency management office, but in most cases these offices have delegated the authority to assign frequencies to area coordinators. Additional details may be obtained from USA FM 24-2 or AFI 33-118 (references (ba) and (bb)). DOE/NNSA and FEMA communications personnel should coordinate frequency requirements through their own channels and keep the military communications officer advised. Failure to get valid frequency authorizations might result in interference with other critical communications.

C13.5.1.5. One of the more complex problems facing the response force communications officer is preparing an SOI. The SOI should be an easy-to-use instruction containing the capabilities and limitations of equipment and detailed “how-to-use” procedures for all available systems. The SOI should be unclassified, if possible, and widely distributed. It should at least include system descriptions (charts and diagrams are helpful), an on-site telephone directory, dialing and telephone routing instructions, message addresses, message handling instructions and routing indicators, radio procedures and call signs, secure voice procedures, and COMSEC operations security procedures, including Essential Elements of Friendly Information (EEFIs). An outline of a typical SOI is at figure C13.F1., below.

C13.5.1.6. Although COMSEC instructions are a part of the SOI, COMSEC deserves additional emphasis. Enemy or dissident elements may be able to intercept and exploit C2 communications systems and traffic used for response to nuclear weapon accidents. Compilations of individually unclassified items concerning weapons communicated during recovery procedures may well be classified, and unfriendly elements may be able to compile these items; therefore, the communications officer must plan to defeat this threat by determining the EEFI for the operation, and then acting to prevent interception or exploitation of this information. COMSEC actions to prevent exploitation of EEFIs may include using secure transmission facilities, communications discipline, codes and authenticators, and changing call signs.

Figure C13.F1. SOI

Signal Operating Instruction
(Sample Contents)

SECTION 1 - Communications Security..

SECTION 2 - Telephone Communications ....

Figure 2-1: Telephone Routing Diagram...
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SECTION 4 - Radio Communications Instructions..

ANNEX A - Response Force Traffic Diagram...

ANNEX B - Telephone Numbers and Message Addresses...

B-l - Tie Line Network Dialing Instructions...
B-2 - On-Site Telephone Diagram...
B-3 - Off-Site Contact Telephone Numbers and Message Addresses..................
B-4 - Intercom Systems ....

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Intercom #2 ....
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ANNEX C - Radio Call Signs ....

Net #1 Grader...
Net #2 Looker ....
Net #3 Catcher ....
Net #4 Ivory ....
Net #5 Blue ....
Net #6 Angel ....
Net #7 Red ....

ANNEX D - Distribution...

C13.5.2. Follow-On Actions. As additional response forces deploy to the accident scene and a support base camp is established, additional communication resources shall be deployed or acquired concurrent with the buildup. As this buildup occurs, the response force communications officer should establish and maintain a list of communications assets and capabilities on scene. The list should include assets and frequencies belonging to non-DoD or DOE/NNSA Agencies identifying potential mutual interference, and should ensure that all possible assets are considered when meeting overall communication requirements. Coordination should be made with the appropriate representative from Federal and civilian authorities and/or officials having on-scene communication systems.

C13.5.2.1. As stressed throughout this chapter, increasing the quantity of communications assets and routing those assets into the appropriate users hands is very important as the response organization grows. Additional communication assets, primarily in the form of telephones and VHF/FM radios, are needed for effective operation of the JIC/CIB and to support radiological monitoring and SR operations.

C13.5.2.2. As the response operations peak, so shall the communications support required. As the response transitions into SR, the primary communications should be routine situation reports, Military Standard Requisitioning and Issue Procedures messages, and other administrative messages. After the weapon(s) and weapon components are removed from the site, little or no need shall exist to communicate by secure voice; however, record communications support provided on-site during the early response and weapon recovery should continue through SR.

C14. CHAPTER 14

PUBLIC AFFAIRS

C14.1. GENERAL

C14.1.1. A nuclear weapon accident has immediate public impact. The general public knows very little about the potential effects of a nuclear weapon accident. The media has routinely publicized plutonium as the most deadly substance on earth. Therefore, public affairs activities during the initial accident response are perhaps among the most critical aspects of the entire response and SR process. Within minutes of the accident, news media might be at the scene. The news media and local citizens shall seek information about how the accident affects them. A proactive, comprehensive public affairs program must be conducted to speed the flow of information to the news media, the public, and internal audiences. Timely, accurate information and frequent updates are essential to keep the public and the news media informed. The fact sheets, checklists, and pre-scripted releases in Appendices 14 through 18 should help PAOs fulfill this mission.

C14.1.2. The OSC's PAO shall establish a JIC (or ensure a CIB is established in foreign territory) as the single on-scene point of interface between the responding agencies and news media representatives covering the response and notify the OSD/Public Affairs immediately of the accident. The OSC shall face a wide range of complex public affairs issues while responding to a nuclear weapons accident. The public affairs functions shall include news media relations, internal or command information, and public outreach. Foremost among the OSC responsibilities is notifying the public, through the local authorities and the news media, that a nuclear weapons accident has occurred, in accordance with LFA policy (DoD policy provided in (reference (x)). The OSC's PAO must establish and maintain coordination with Federal, State, and local response organization public affairs representatives and/or spokespersons to ensure unity of effort. Especially important is communication with the LFA's Public Affairs Office. Providing information that is timely, accurate, understandable, and in perspective is essential to establish and maintain credibility with the public, the news media, and response forces. The success of the response to the accident is only as good as the public's perception of the response.

C14.2. PURPOSE AND SCOPE

This chapter provides general public affairs guidance for a nuclear weapon accident occurring in U.S. or foreign territory.

C14.3. POLICY

C14.3.1. The DoD policy for U.S. nuclear weapons accidents, which is described in reference (x), is to provide effective public affairs activities near the scene of a nuclear weapon accident to speed the flow of information to the public and the internal audience. Although it is

routine DoD policy to neither confirm nor deny the presence or absence of nuclear weapons or nuclear components at any specific location, exceptions exist when a nuclear accident occurs. Joint Pub 3-61 (reference (bc)) provides further guidance on DoD support to media in conjunction with military operations.

C14.3.1.1. In the United States, its territories, or its possessions, DoD policy requires the OSC to confirm the presence of nuclear weapons or radioactive nuclear components in the interest of public safety or to reduce or prevent widespread public alarm. Public authorities must be notified if the public is, or may be, in danger of radiation exposure or other danger posed by the weapon or its components.

C14.3.1.2. Statements confirming the presence of nuclear weapons should contain information about the possibility of injury from HE weapon components and/or potential radiation exposure. If injury or radiation exposure is unlikely, that should also be stated. The LFA's public affairs office should be notified in advance, or as soon as possible thereafter, if these exceptions are used.

C14.3.2. The DOE/NNSA's policy is to provide accurate, candid, and timely information, consistent with the requirements of the Freedom of Information Act and the Privacy Act (Sections 552 and 552a of title 5, U.S.C. (reference (bd)), to the public during all emergencies, to establish facts and avoid speculation. In situations involving classified information, DOE policy is to provide sufficient unclassified information to explain the emergency response and protective actions required for the health and safety of workers and the public, in accordance with DOE Order 151.1A (reference (be)).

C14.4. RESPONSIBILITIES

The OSC's PA responsibilities are shown in paragraphs C14.4.1 through C14.4.10., below. During a DoD-led response, the supported Combatant Commander may impose additional requirements in appropriate Service regulations. The OSC's PAO shall inform the public and news media through a variety of means.

C14.4.1. Protect classified information. Responders must practice "security at the source" to ensure no classified, sensitive, or privacy information is provided to the media or the public. The OSC reviews all information about nuclear weapons intended for public release. Information about nuclear weapon and component design and their storage is classified. In addition, unclassified controlled nuclear information must be protected from public release. When the JIC/CIB responsibility is transferred, be careful to ensure nuclear weapons information proposed for public release is reviewed by the appropriate U.S., DoD, and DOE/NNSA offices.

C14.4.2. Establish direct communications with the Department-level public affairs office (Office of the ASD(PA) or the DOE/NNSA Office of Public Affairs) from the accident scene. The OSC should ensure that the PAO at the scene quickly establishes direct communications with the Department-level public affairs office by any means available. The OSC must have access to current policy guidance and statements issued at the national level. Direct

communications ensure that timely, accurate information may be provided at the accident scene and the national level. All the Combatant Command, Military Department, DTRA, DOE/NNSA, and FEMA public affairs offices shall be kept informed, as appropriate, of news releases and media interest. The U.S. COM and the U.S. DOS PAO shall be notified and consulted on accidents overseas or on accidents and significant events near a U.S. border.

C14.4.3. Establish an ICC in cooperation with State and local authorities in the United States, and with the DOS and host nation authorities outside the United States. The ICC should be collocated with the OSC and his or her counterparts. In the United States, the ICC should be composed of one senior, co-equal public affairs representative from the OSC, the local authorities, and the State emergency response organization. In foreign territory, the ICC should be composed of the senior U.S. Military and the host nation national and local emergency response authority. The ICC shall plan, manage, and coordinate the on-scene public affairs response. The ICC should coordinate on JIC news press releases before OSC final approval. Shortly after the initial release is made, or when appropriate, the OSC shall assume release authority from the OSD. The on-scene public affairs shall continue to keep the OSD/Public Affairs informed as information is made available.

C14.4.4. Establish a JIC/CIB in cooperation with the State, the DOS, the host nation, and local authorities near the accident scene. The JIC/CIB should be established in accordance with DoD Directive 5400.13 and DoD Instruction 5400.14 (references (bf) and (bg)) during a DoD-led response and reference (be) and DOE Guide 151.1-1 (reference (bh)) during a DOE/NNSA-led response. The JIC/CIB serves as the focal point for information about the accident and the response. A JIC/CIB location in a permanent structure is preferred due to support requirements. Local emergency management officials may have available or designated facilities that may be used. The OSC should provide dedicated administrative, communications, and logistic support for the JIC/CIB. A list of support equipment is in Appendix 15.

C14.4.4.1. In the United States, its territories, and its possessions, the OSC shall establish and direct the JIC until the response effort transitions to another Agency.

C14.4.4.2. In foreign territory, the OSC responsibility may vary, depending on whether a bilateral agreement has been signed with the country. In the absence of an agreement specifying responsibilities, the OSC shall work with the U.S. COM to establish and co-direct a CIB with the host nation.

C14.4.5. Identify and establish, in cooperation with State and local authorities, the DOS, and host nation authorities, a news media briefing area near the accident scene, but not in a location that interferes with response activities.

C14.4.6. Support news media at the accident scene. The OSC may support news media representatives covering a nuclear weapon accident. Support shall be the same as that authorized on a military reservation (for example, transportation, logistic, and administrative). Support shall depend on the situation and available resources. The media should be briefed on the extent of support available.

C14.4.6.1. Federal, State, and local authorities should jointly establish a media center. Many local authorities already have designated locations. The center should be collocated with the news briefing center, if possible. Initial information provided to the news media should be limited to basic, releasable facts. A news media work area should be established as soon as practical.

C14.4.6.2. Photographers and film crews may arrive on scene before a cordon is established. The first PAO on scene should ensure that the initial emergency response force has covered classified or sensitive material. The PAOs should work with police and/or security personnel to identify suitable vantage points for photographers.

C14.4.6.3. Pre-approved handouts, video footage, and photos providing background information should be made available, as appropriate.

C14.4.6.4. The news media may be allowed access to the accident site after the area has been made safe and secure. They should be escorted at all times.

C14.4.6.5. Briefings should be conducted as soon and as often as practical (when there is new information to provide). Subject matter experts should be available for briefings and interviews.

C14.4.6.6. The news media should be provided regular photo and film opportunities with specialists and members of the response force, as appropriate.

C14.4.6.7. A news media pool facility may be formed if all the media may not be accommodated near the accident scene. They shall decide which organizations shall be represented at the facility.

C14.4.6.8. Official photographs or video taken by response force personnel or audiovisual crews may be released to the media through the JIC/CIB after security review to ensure it does not contain classified information or military controlled technology.

C14.4.7. Provide internal information. The OSC should ensure that all (military and civilian) response force personnel are briefed on the public affairs policy when they in-process and ensure that they are informed on accident response through an internal information program. When news releases and statements are issued to the news media, they should also be issued to the internal audience. They should be coordinated with the ICC and approved by the OSC before release. Commanders and technical experts may speak to response force and installation audiences in a “town meeting” format if circumstances warrant. Responders should refer the news media to the JIC. An intranet website should be established, if possible, with a news and information page managed by the JIC/CIB. Logistics information, such as dining hours, should be distributed by the organizations responsible for providing the service. Responders should consider producing a newsletter on response activities and issues for distribution to response personnel.

C14.4.8. Work with State and local or U.S. COM and/or host nation authorities to identify and respond to public outreach needs. The OSC should identify public concerns about the accident and response activities and take appropriate action in cooperation with the FCO, State and local authorities, or the U.S. COM and host nation representatives. As soon as public affairs personnel arrive at the accident scene, they should ensure a mechanism is in place to plan a public outreach program and to analyze feedback from the public, the news media, and local authorities to ensure the public affairs program meets the affected public's needs. Programs should be initiated, modified, or stopped based on data evaluation. An internet website should be established and regularly updated to provide information on the accident and response efforts. Phone lines should be established with a published number for public inquires. Public concerns may include:

C14.4.8.1. Short- and long-term health and safety issues;

C14.4.8.2. Response and recovery activities and timelines;

C14.4.8.3. Impact on the economy;

C14.4.8.4. Impact on the environment;

C14.4.8.5. Legal claims protocol; and

C14.4.8.6. Reimbursement for evacuation and/or lost income.

C14.4.9. Review and evaluate news media reports about the accident response to ensure accurate information is provided to the public. The OSC should ensure the JIC/CIB news monitors media reports to determine if key messages are understood and issued through the media to the public. Misinformation should be corrected immediately. Sample JIC/CIB key messages and non-releasable information examples are listed in Appendix 16. Media analysis information obtained should be provided to response organizations on scene as well as to the higher HQ.

C14.4.10. Planning tips the OSC may use in a response situation are in Appendix 19.

C14.5. RESOURCES AND ROLES

All PAOs in the JIC should establish a public affairs information bridge from the JIC to their respective responders and their HQ. This information bridge shall ensure that all Agencies involved in the response have information about what is being said or released to the media. The DoD IRF and RTF Commander should have PAOs from the supporting installation and/or staff as members of the response force. At least one PAO should be part of the IRF. Other public affairs support is available from the organizations listed in paragraphs C14.5.1. though C14.5.6., below, and interagency cooperation shall be required to ensure timely, accurate, and consistent communication with the news media and the public.

C14.5.1. The Department of Defense

C14.5.1.1. The Office of the ASD(PA), as the senior DoD public affairs organization, coordinates with the White House, the DOS, the DOE/NNSA, the FEMA, and other appropriate Federal Departments and Agencies. PAOs from the Combatant Command's component commands may supplement the OSC's public affairs staff. A DTRA CMAT PAO is available to provide advice and assistance in the JIC/CIB.

C14.5.1.2. When an accident occurs, a PAO from the Joint Chiefs of Staff should be included in the JNAIRT. The Joint Chiefs of Staff PAO shall help public affairs channels at the accident site and at the departmental level in gathering operational information. Typically, the JIC shall be preoccupied with on-scene media and public queries, and the DoD public affairs team shall be busy with political, congressional, and agency queries. The JNAIRT, however, is directly connected to operations channels, which places the Joint Chiefs of Staff PAO in a good position to gather, confirm, and share information with other public affairs levels. The Joint Chiefs of Staff PAO is not a release authority on nuclear weapon accidents.

C14.5.2. The DOE. Under DOE policy, a DOE/NNSA PAO shall accompany the DOE/NNSA SEO to the accident scene and be present in the JIC/CIB. Other DOE/NNSA public affairs personnel from DOE/NNSA field operation offices, national laboratories, and DOE/NNSA contractors may also be requested to supplement the JIC/CIB operations.

C14.5.3. The DOS. The U.S. COM shall be the focal point for diplomatic and political decisions on the USG response. A team from the Embassy's Emergency Action Committee, with supplementation as required, shall assist the COM.

C14.5.4. The FEMA. When the accident occurs in the United States or its territories, a FEMA public affairs representative shall accompany the FCO to the scene and work in the JIC. Additional FEMA public affairs and public outreach resources are available from the FEMA HQ, regions, and the FEMA's corps of reserve PAOs.

C14.5.5. Other Federal Organizations. PAOs from other Federal Agencies involved in the response effort may be present at the scene and should be integrated into the JIC. Typically, there are representatives from Agencies such as the HHS, the EPA, the USDA, and the DOT.

C14.5.6. State and Local. PAOs from State and local response organizations, especially fire, police, and emergency management, are key to a successful response. They are likely to arrive at the accident scene before Federal response forces. State and local representatives should be encouraged to become co-equal partners in public affairs operations. Shared Federal, State, and/or local leadership of public affairs operations should ensure a timely, accurate, consistent, and coordinated response. If that is not possible, plans and information must be closely coordinated with State and local public affairs personnel and they should be encouraged to send representatives to help set up and take part in the JIC and news media briefings. State public affairs on-scene representatives may come from emergency response, agriculture, environmental, health, safety, and transportation agencies. Local public affairs on-scene representatives should be expected from fire, police, and emergency management organizations as well as utilities.

C14.5.7. Foreign Territory. The theater PAOs shall coordinate with the U.S. Embassy in the host nation, as well as the Office of the ASD(PA), to respond to a U.S. nuclear weapon accident in foreign territory. Host nation PAOs should be expected to respond. They include representatives from the military; national-level health, safety, interior, agricultural, and environmental organizations; and local response organizations. Local fire, police, and emergency management PAOs should be expected on scene and are likely to arrive at an accident occurring off an installation before U.S. forces. These officials are integral to a successful public affairs operation. In the absence of a bilateral agreement, they should be encouraged to form a combined, coordinated response modeled on the JIC concept.

C14.5.8. The Internet and the World Wide Web offer an efficient means for response forces to communicate messages and information worldwide. After confirmation of a U.S. nuclear weapons accident, the DoD web site, "DefenseLINK" should establish a page with information about the accident or link to an LFA-established web site. For a DoD-led response, the JIC/CIB should ensure releasable information is forwarded to this site. As soon as practical, the JIC/CIB should determine whether a joint and/or combined response force web site is more appropriately handled by a local organization or another organization with links to other sites, as appropriate.

C14.6. PUBLIC AFFAIRS RESPONSE ORGANIZATIONAL CONCEPT

C14.6.1. ICC. An ICC of public affairs decision makers should be established to develop a public affairs strategic plan that incorporates key messages and ensures frequent coordination with higher HQ and organizations not represented in the JIC/CIB. The ICC should consist of a senior, co-equal on-scene public affairs representative from the OSC, State emergency response (or foreign national government and/or military), and a local (police and emergency response) public affairs officer. The ICC should be located with the OSC and other senior response leadership. The ICC should:

C14.6.1.1. Authorize JIC/CIB release of information.

C14.6.1.2. Ensure response personnel are prepared for news briefings and interviews.

C14.6.1.3. Ensure adequate staffing, equipping, and support of the JIC/CIB and any sub-JICs/CIBs.

C14.6.2. JIC/CIB. The JIC/CIB is established for news media relations; however, internal information and public outreach programs may be collocated in separate areas of the JIC/CIB, as appropriate.

C14.6.2.1. The JIC/CIB should include representatives from all participating organizations that have public affairs personnel. Computer and administrative support is required.

C14.6.2.2. Public affairs personnel must be assigned to the accident scene to handle news media at that site and to gather information to provide to the JIC/CIB and the ICC.

C14.6.2.3. The JIC/CIB personnel research, prepare, and coordinate responses for news media queries; notify news media of briefings; arrange interviews; coordinate photo, film, and video opportunities; and monitor media reports and provide feedback to the ICC.

C14.6.2.4. The JIC/CIB personnel support the ICC by setting up news briefings, providing recordings and transcripts of briefings and key interviews, arranging and briefing news media escorts, and ensuring frequent contact with the news media and/or media center.

C14.6.2.5. The JIC should implement an internal information program for responders.

C14.6.2.6. The JIC should implement a public outreach program and ensure response force public affairs and other members take part, as appropriate.

C14.6.2.7. The JIC/CIB layout should include:

C14.6.2.7.1. Private JIC/CIB director work area with telephones for the co-directors.

C14.6.2.7.2. Media response area with telephones and internet access.

C14.6.2.7.3. Multi-agency work area with telephones and internet access.

C14.6.2.7.4. Administrative support area.

C14.6.2.7.5. Conference area for JIC/CIB meetings.

C14.6.2.7.6. A multimedia area to collect, monitor, and review media coverage.

C14.6.3. <u>Media Center</u>. The media center is the news media work area. This should be collocated with the media briefing area, when possible.

C14.6.4. <u>Media Briefing Area</u>. The OSC's PAO, working with local authorities (police, emergency response, and county), should select a large area with adequate seating, acoustics, power, and lighting for news media briefings. This should be collocated with the media center, when possible.

C14.6.5. <u>Sub-JIC/CIB</u>. Public affairs representatives should be assigned to the accident site to gather information, escort news media, and distribute internal information products to on-site personnel. The OSC should provide these personnel with adequate communications, logistic, and transportation support.

C15. CHAPTER 15

LEGAL

C15.1. GENERAL

A nuclear weapon accident presents a myriad of complex legal problems for the OSC. The OSC represents the USG to the Executive Departments, other Federal Agencies, State and local officials, and the general public. Legal issues range from complex questions on jurisdiction and authority to exclude the general public from specific areas, to paying simple personal property claims. The response force organization should include a legal element to advise and assist the OSC in resolving these issues. During a DoD-led response, the senior military member of the legal element responding with the staff of the OSC is the DoD PLA to the RTF Commander. During a DOE/NNSA-led response, the PLA is the Legal Advisor from the DOE/NNSA Albuquerque Operations Office that deploys with the SEO.

C15.2. PURPOSE AND SCOPE

This chapter identifies specific requirements, resources, and actions to resolve legal issues. It also provides a reference list of statutory authorities, regulations, and instructions.

C15.3. SPECIFIC REQUIREMENTS

The PLA shall:

C15.3.1. Advise the OSC and functional staff elements on any legal matters related to the accident. Advise the OSC on authority for establishing jurisdiction and authority for establishing an NDA in accordance with reference (w) and section 797 of reference (ap).

C15.3.2. Organize and supervise the legal functional element at the site of the accident, including facilitating a claims processing facility.

C15.3.3. Ensure that the claims processing facility is accessible to the public and mutually agreeable to local officials. As soon as the claims processing facility is established, the JIC/CIB should be provided information on the location for inclusion in a news release.

C15.3.4. Coordinate technical legal matters with a higher authority, when required.

C15.3.5. Coordinate legal issues with the PLAs of other participating Departments or Agencies, and the Combatant Commander’s and DoD GC as required.

C15.3.6. Provide legal advice and assistance to other Federal officials, on request.

C15.3.7. Review operational plans to identify potential legal problems and ensure that they are legally sufficient, with emphasis on security, radiological safety, environmental law, and the preservation and/or documentation of evidence for use in any resulting criminal prosecutions, resolving claims or other litigation.

C15.3.8. Ensure that all legal personnel work closely with the PAO to ensure no hidden legal implication shall impact response efforts.

C15.3.9. Coordinate on the RUF, and the Rules of Engagement as necessary outside the territory of the United States, before finalization.

C15.4. RESOURCES

C15.4.1. Providing timely and sound legal advice and assistance depends on adequate personnel and communication among functional elements. The designated legal element of the OSC's staff should include, at lease two attorneys and one legal clerk available for 24-hour operations in support of the JOC. In the event of a DoD-led response, the legal element of the IRF should stay at the site as an additional resource. Depending on the nature of, and circumstances surrounding an accident, additional personnel may be required. Pre-designated response forces should ensure that the assigned legal element is aware and capable of addressing the complex and politically sensitive national defense issues that evolve from a nuclear weapons accident as well as managing and administering a claims processing facility.

C15.4.2. Other Federal Departments and Agencies may include a legal advisor as an element of their response force. To assure consistency, all legal advice and assistance should be coordinated jointly through the DoD or DOE/NNSA PLA.

C15.4.3. The GC, DTRA, is a member of the CMAT and shall deploy to the accident site to advise and assist the PLA.

C15.5. CONCEPT OF OPERATIONS

This concept of operations establishes guidelines for the operation of the PLA and his or her staff. Circumstances surrounding an accident are the driving force of the sequential order.

C15.5.1. Planning. The PLA must be knowledgeable about the authority and responsibility of the Department of Defense and the DOE/NNSA, as well as that of the various other Federal Departments and Agencies in a nuclear weapon accident. Inherent in this event are the relationships between international, national, State, and local authorities, as well as jurisdictional principles, security requirements, environmental requirements, and claims administration. Since requests for legal advice require immediate response, and adequate research facilities are unlikely to be available on-site, designated legal elements should prepare a handbook of references, including those listed at Appendix 20. These references provide the authority and some background for subject areas, such as establishing the NDA, law enforcement, use of force,

evacuation of civilians, and damage to public or private property. The handbook should be tailored to the respective Service or Agency.

C15.5.2. Initial Actions

C15.5.2.1. The OSC and his or her staff must have immediate access to the PLA; accordingly, the legal element should be located in or near the JOC.

C15.5.2.2. Providing timely and legally sound advice and assistance is mostly based on communication; therefore, liaison must be established with all the major functional elements of the OSC's staff to make all elements aware of the need for coordination of planned actions.

C15.5.2.3. Maintain a prioritized list of planned actions and events and a record of completed actions.

C15.5.2.4. The claims processing facility should be established at a location easily accessible to the public and mutually agreeable to local officials. Depending on circumstances, more than one claims facility may be required. The claims processing facility should be collocated with the civil emergency relief and assistance office, when possible. As soon as the claims processing facility is established, the JIC/CIB should be provided information on the location for inclusion in a news release.

C15.5.2.5. Claims processing personnel should be aware of the sensitive nature surrounding the accident. The PLA ensures that any information provided to claimants is according to established policies, and that queries for any information other than claims procedures are referred to the PAO.

C15.5.2.6. Response efforts may necessarily result in the disturbance and/or destruction of physical evidence that may later prove to be significant in resolving claims, criminal prosecution, or other litigation. Accordingly, the PLA should take immediate action to ensure factual and evidentiary information is preserved for both safety and/or criminal investigations and claims resolution. This includes photographs and/or videos, interviews with witnesses, documentation of radiological hazards and safety procedures, identification of responding forces and civilians at or near the accident scene, and appropriate recording and receipting of property.

C15.5.2.7. The PLA must identify and establish liaison immediately with local law enforcement officials, legal authorities, and State and local emergency response organizations.

C15.5.2.8. To ensure that legal advice is timely, responsive, and consistent, the PLA should establish liaison with legal advisors representing other Federal Agencies at the accident site.

C15.5.3. Follow-On Actions. The PLA, or a representative, stays at the scene until the response operation is complete. The PLA advises the OSC until the claims processing facility should stop operations.

C15.5.4. Public Affairs. Adverse publicity is inherent to a nuclear weapon accident simply by its occurrence. Mishandling of public affairs may impact claims and litigation, result in a loss of confidence by the public in the actions of the USG in the cleanup process, or have long-term political and financial implications that might undermine support for the Nation's nuclear deterrent capability. It is therefore essential that:

C15.5.4.1. Legal personnel work closely with the PAO to ensure that no hidden legal implications impact response efforts.

C15.5.4.2. All personnel involved in the response effort must refer all media and public queries for information to the PAO.

C15.5.4.3. Legal personnel coordinate with the PAO to review proposed public statements for legal sufficiency and implications.

C16. CHAPTER 16

LOGISTICS SUPPORT

C16.1. GENERAL

The Military Service or Defense Agency aiding or responding to a nuclear weapon accident shall fund any costs initially incurred from its own existing funds. The Military Service or Defense Agency having possession of the nuclear weapon or nuclear weapon components during the accident is responsible for reimbursing, on request, the assisting or responding Military Service or Defense Agency. These reimbursable costs are above and beyond the responder's normal operating costs and must be directly related to or caused by operations in response to the accident. DoD 4000.25-1-M (reference (bi)) should be used, as possible, supplemented by local service contracts. The amount of logistics support depends on the location of the accident and the extent of contamination, if any. If an accident results in extensive contamination, Crisis Management and CM actions, including SR and recovery operations, may involve up to 2,500 people, extending to 6 months or longer to complete. Specific accident needs may increase or decrease these requirements. As a minimum, billeting, messing, and sanitation services shall be provided.

C16.2. PURPOSE AND SCOPE

This chapter guides logistics support matters peculiar to a nuclear weapon accident. Included are discussions for establishing a project code, base camp support, transportation, and some radiological support.

C16.3. SPECIFIC REQUIREMENTS

Commanders and logistics officers of forces responding to a nuclear weapon accident should determine the availability of assets and facilities at, or near, the scene of the accident and initiate actions to get support to satisfy the following requirements:

C16.3.1. Medical evacuation of acute casualties and processing of fatalities.

C16.3.2. Rapid transport (air or ground) from the airhead or the nearest military installation during early stages of accident response.

C16.3.3. Airhead cargo support for air delivery of supplies to remote sites.

C16.3.4. Transportation.

C16.3.5. Messing and billeting facilities for response force personnel.

C16.3.6. Sufficient water, potable and non-potable, to support response force personnel, equipment and personnel decontamination stations, temporary fixation of contamination by sprinkling, and leaching operations.

C16.3.7. Maintenance support.

C16.3.8. Working space or shelters for responders working in the forward operations area.

C16.3.9. Sanitation facilities for response force personnel and news media.

C16.3.10. Heavy equipment for base camp construction and recovery and/or remediation operations.

C16.3.11. POL.

C16.3.12. Packaging and shipping materials for weapons, components, and contaminated waste and other radioactive materials.

C16.3.13. Electrical power.

C16.3.14. Personal protective and other specialized clothing (climate dependent).

C16.3.15. Laundry facilities for contaminated and uncontaminated clothing.

C16.3.16. Logistical support unique to the JIC/CIB (see Chapter 14, Public Affairs).

C16.3.17. Documentation of accident-related costs.

C16.4. RESOURCES

Response to a nuclear weapon accident is a high priority operation, and all required resources from the Department of Defense, the DOE/NNSA, and other Federal Agencies with a radiological or disaster response capability are usually available to the accident response forces. Use of local facilities and equipment near the accident scene, such as National Guard armories and vehicles, gymnasiums, and hotels, may be a workable solution to some of the logistic problems. Military installations near the accident site may provide a supply point, messing, and billeting for response force personnel.

C16.4.1. Base Camp Support. If the accident location dictates establishing a base camp for response personnel, HARVEST EAGLE/HARVEST FALCON, a mobile messing and billeting package maintained by the USAF, may be used. Details on HARVEST EAGLE/HARVEST FALCON capabilities and request procedures are in Chapter 2 and Appendix 21.

C16.4.2. Personal Protective Clothing. Sources of personal protective clothing are in Appendix 21.

C16.4.3. Contaminated Clothing Laundering Facilities. Commercial contaminated clothing laundry facilities are available and may be identified with the assistance of the DoD JNACC.

C16.4.4. GSA Support. A GSA representative may accompany FEMA personnel and may help get telephone service, office and other building spaces, and other administrative and support services.

C16.5. CONCEPT OF OPERATIONS

The importance of the logistics staff officer's involvement in developing the accident response plan from its conception may not be overemphasized. It is a basic responsibility to ensure that decontamination and remediation operations are supportable. Base camp logistics support represents a rather routine situation and is almost totally dependent on the number of personnel involved and the duration of the operation. By working together, the Department of Defense and the DOE/NNSA shall help to ensure that logistics requirements are coordinated between the two Departments and any necessary assistance is provided.

C16.5.1. Planning. Planning is initiated to identify the location and availability of items not organic to the response organization and that might be a limiting factor to the response effort. Such items may include Mylar® for radiation instrument probe faces, protective masks, mask filters, and anti-contamination clothing. The logistics staff at the accident site should be tailored to support requirements, but should at least consist of the following:

C16.5.1.1. Senior Logistics and/or Support personnel who are knowledgeable of their Agencies' capabilities and requirements.

C16.5.1.2. A material control officer.

C16.5.1.3. Three or four administrative supply personnel to maintain the document register and submit requisitions.

C16.5.2. Project Code Generation. Once notified, the LFA should immediately request the tracking of project costs.

C16.5.2.1. DoD Procedures. The RTF logistics staff officer should request assignment of a Joint Chiefs of Staff project code from the Joint Materiel Priorities and Allocations Board, an Agency of the Joint Chiefs of Staff, through the OSC, the Joint Staff, the Military Service HQ, or the Unified Command HQ, as appropriate. Once approved, all response-related requisitions should contain the Joint Chiefs of Staff project code. For processing purposes, requisitions with a Joint Chiefs of Staff project code shall be ranked above all other requisitions with the same priority designator. When a Joint Chiefs of Staff project code is assigned, the Defense Logistics Agency shall issue implementing instructions to all concerned.

C16.5.2.2. Project Code Requests. The Joint Chiefs of Staff project code request includes the following information:

C16.5.2.2.1. The type of project code required (always 9 Alpha Alpha).

C16.5.2.2.2. Project name.

C16.5.2.2.3. Service monitor or coordinator.

C16.5.2.2.4. Proposed effective date.

C16.5.2.2.5. Proposed termination.

C16.5.2.2.6. Force and/or activity designator.

C16.5.2.2.7. Brief narrative background on the nature of the requirement.

C16.5.2.2.8. Where available, units and forces using the project code.

C16.5.3. Installation Support. The logistics staff officer should identify military installations and DOE/NNSA facilities nearest the accident site and establish liaison to determine their support capabilities. The installations should be alerted of potential support requirements. If the nearest installation is not within two to three hours driving distance, requesting helicopter support to help meet urgent logistic requirements during the early days of the accident response should be considered. Procedures for submitting requisitions and picking up supplies from nearby military installations should be established.

C16.5.4. Base Camp Establishment. The accident location determines if a base camp is needed for feeding and billeting response force personnel, or if local facilities may be used. Any military base within acceptable driving distance and available local facilities should be considered before establishing a base camp. If required, HARVEST EAGLE and HARVEST FALCON kits may be requested from the USAF. When establishing a base camp, water supply and sanitation facilities must be considered. If a power generating facility is required, it should be positioned so that it provides power for both the base camp and operations center areas.

C16.5.5. Vehicular Support. A wide variety of vehicles, both in tonnage and purpose, are required to support response operations. If operations continue more than 30 days, equipment maintenance may become a major consideration. To keep the number of maintenance personnel on-site to a minimum, frequent rotation of vehicles with the providing organization is recommended. As an alternative, consideration may be given to replacing unit vehicles with rented or leased vans with six- to nine-passenger and cargo carrying capacity when an off-road capability or vehicle-mounted radio is not a specific requirement. A sufficient supply of GSA, Defense Energy Support Code, or DOE/NNSA personnel who have Government Purchase Cards should be available for refueling vehicles used in areas where Government fueling facilities may not be available. Vehicles in contaminated areas should not be removed for maintenance or returned to the owning organization until after they have been decontaminated. Minor on-site maintenance of contaminated vehicles may, therefore, be necessary. Base camp construction

and/or SR may also require heavy equipment. If resources are obtained through a contract, and work shall be done in the contaminated area, decontamination criteria and hazardous working conditions shall be addressed in the contract.

C16.5.6. <u>Local Service Contracts</u>. Use of local service contracts to ease logistics support is recommended for the following services:

C16.5.6.1. POL.

C16.5.6.2. Water.

C16.5.6.3. Sanitation.

C16.5.6.4. Maintenance.

C16.5.6.5. Laundry of noncontaminated clothes.

C16.5.6.6. Radiological waste

C16.5.7. <u>Contaminated Clothing Laundry Support</u>. Decontaminating and cleaning personal protective clothing is a critical requirement supporting accident response operations. Additionally, it may be necessary for the response force to help decontaminate area residents' clothing. While the sensitivity to collecting additional solid radiological waste from the civilian community is understandable, washing radioactive clothing, if the proper safety mechanisms are not in place, might create more waste. Commercial laundry facilities that provide this service may be identified through the DoD JNACC.

C16.5.8. <u>Dissemination of Procedures</u>. Provisions should be made to ensure that all personnel or units responding to the accident are provided written information describing procedures to follow in requesting logistical or administrative support. This information should indicate clearly to whom requests should be submitted and the approval authority. The status of all requests should be monitored and any problems encountered reported to the requesting person or organization.

C16.5.9. <u>News Media and JIC/CIB Support</u>. Advance planning should take into account the possible billeting, messing, and transportation support for news media, as authorized by DoD, DOE/NNSA, and Service directives. The number of media personnel might vary from a small number to hundreds depending on the severity of the accident. Close coordination is required with the PAO to determine specific requirements. The JIC/CIB should be provided full logistical support including transportation, expendable and non-expendable equipment, and supplies. Specific requirements shall be decided by the PAO.

C17. CHAPTER 17

TRAINING

C17.1. GENERAL

This section identifies for senior staff planners and potential OSCs the general provisions of a training program and how they may be integrated to meet the intended goals of reference (b). This chapter outlines the general structure of training mechanisms designed to train personnel on their specific tasks and responsibilities in responding to an accident. Further, it contains additional sources of information about courses and other resources available to planners on nuclear weapon accident response training and planning. Section C17.4. provides information for Defense Nuclear Weapons School (DNWS) and DOE courses available that may be beneficial to persons responsible for preparing a training program on accident response capabilities.

C17.2. PURPOSE AND SCOPE

The purpose of Accident Response Training is to ensure personnel are capable and skilled to successfully execute the recovery and mitigation actions required because of a nuclear weapon accident. Equally important is for response teams to achieve a posture capable of responding to a nuclear weapons accident with accuracy, safety, and appropriate methodologies and procedures. Training exercises and evaluations are essential to prepare forces for actual accidents using real world scenarios. Further, they address relevant conditions and situations that may affect all levels of nuclear weapon accidents. Training programs may also help to exercise chains of communication and coordination for inter- and intra-agency response integration.

C17.3. TRAINING SYSTEMS

A recommended template for developing training exercises to address these three essential parts is the Instructional Systems Development (ISD) plan, the DoD training standard. In its simplest form, the ISD plan integrates analysis, design, development, implementation, and evaluation to create complex systems models that include all aspects of the instructional design process. These aspects often include conducting mission analyses, writing performance objectives, or developing standard-referenced tests.

C17.3.1. The manifestation of this methodology is the Joint Training System (JTS), which provides a multi-phased program for aligning a training strategy to achieve the desired level of expertise. The first phase of the system is the Requirements phase. During this phase the mission is analyzed to identify specific tasks required for mission accomplishment. These specific tasks then form the basis for developing the Joint Mission Essential Task List. These tasks, indispensable to mission success, form the basis of the joint training requirements.

C17.3.2. For the second phase of the JTS, Planning, the training requirements are translated into training objectives to ease the development of training plans and exercises that shall be used to ensure the training audiences achieve the prescribed levels of performance. This planning must also address the variables that exist in training methods which might include target population characteristics (rank, seniority, etc.), criticality, learning difficulties, frequency of performance, pre-existing conditions, and the level of expertise expected after the lessons. The most effective environment for learning and executing the tasks must also be addressed. Combined, these are used to produce the Joint Training Plan, and/or the Combat Support Agencies Training Plan.

C17.3.3. Execution is the third phase of the JTS. Execution of training plans is effected through the Joint Event Life Cycle methodology. This cycle, focused within the execution part of the JTS is comprised of several stages of exercise development: design, planning, preparation, execution, evaluation, and reports. This phase also captures issues, lessons learned, and observations noted while conducting the planning and execution of the training exercise. This information is very useful for improving future training exercises.

C17.3.4. The fourth and final phase of the JTS involves assessing the proficiency of mission performance while taking into account outputs from training events, real-world operations, missions, and other sources and identifying deficiencies. This analysis is later used to determine overall capabilities, shortfalls in training, and how effectively the written plan may be executed.

C17.3.5. Once they have completed the training programs, personnel shall be able to respond to an accident involving a nuclear weapon or radiological material according to established plans and standards. Further, personnel shall know the proper procedures for notifying appropriate response agencies, establishing the security of the accident site, conducting radiological measures to ensure personnel safety, and all other matters of response tasks to the specified levels of proficiency.

C17.4. TRAINING COURSES

C17.4.1. DNWS. The DNWS at Kirtland AFB, NM, offers a variety of courses designed to develop and maintain a nuclear weapon emergency response capability. These courses are available to all Service personnel and employees of the Federal Government whose positions require special skills and knowledge in nuclear weapon emergency situations. A list of available courses at the DNWS is in table C17.T1., below. The DNWS registrar may be contacted at 505-846-5666 or through e-mail at DNWS@AO.DTRA.MIL

C17.4.2. The DOE. The DOE offers many classes in all levels of radiological response. These courses at all of the various DOE training facilities may be accessed through the Emergency Operations Training Academy, a division of the Nonproliferation and National Security Institute, at http://www.eota.doe.gov. They may also be contacted at (505) 845-5170 or through e-mail at EOTA@nnsi.doe.gov.

C17.4.3. AFRRI. The AFRRI in Bethesda, MD, puts on several courses a year on the Medical Effects of Ionizing Radiation. These courses are given locally and at U.S. Military installations worldwide. Courses range in length from 2 to 5 days. Additional information and registration are available at www.afrri.usuhs.mil. The telephone number for information is (301) 295-0316 or DSN 295-0316.

Table C17.T1. DTRA DNWS Nuclear Weapon Accident Response Training Courses

COURSE	CONTENT	DURATION
Radiological Accident Command, Control, and Coordination Course	Provides training in responsibilities; problem resolution involved in a radiological weapons accident.	5 days
Nuclear Weapons Orientation Course (NWOC)	Provides an overview of the U.S. nuclear weapons program.	5 days
WMD Proliferation Terrorism and Response Course	Provides an overview of the worldwide threat posed by nations armed with chemical, biological, and nuclear WMDs. Describes the capabilities of WMD States, non-State actors, and the U.S. response to WMD proliferation.	4 ½ days
Radiological Emergency Team Operations Course	Covers the scope of actions required to respond to a radiological accident as a radiological emergency team member, basic physics, accident and/or incident history, and FRPs and capabilities.	9 days
Joint Nuclear Explosive Ordnance Disposal Course	Provides detailed sustainment training for officers and enlisted Service members in nuclear EOD operations.	5 days
Joint DoD/DOE Nuclear Surety Executive Course	Provides an overview of safety, security, and control features incorporated into stockpiled nuclear weapon systems.	1½ days
WMD Command, Control, and Coordination Course	Designed for DoD Installation Commanders and their direct support staff who are responsible for decision-making in response to a WMD incident. Attendees shall apply basic critical-decisions to a WMD incident on a DoD installation, next to a DoD installation, and in support of DoD, Federal, or State requests.	4 days
Nuclear Weapons Familiarization Seminar	Provides a condensed version of the NWOC.	3 days
WMDs Incident Response Workshop	Provides commanders, their staff, and other agencies with decision-making responsibilities involving WMD incidents, with basics on how to	3 ½ days

Table C17.T1. DTRA DNWS Nuclear Weapon Accident Response Training Courses, continued

COURSE	CONTENT	DURATION
	respond to a WMD incident.	
Civil Support Team Radiological Training Course	Covers the response elements to a radiological incident. The training is tailored to the mission requirements of individual National Guard Civil Support Teams.	3-5 days
WMDs Staff Officers Course	Offered in conjunction with the Department of Defense's emergency Preparedness Course. Participants shall be exposed to DoD roles, responsibilities, and assets that support CM of a domestic WMD event.	varies
Theater Nuclear Operations Course	Provides training for staff nuclear planners for joint operations and targeting (based on Joint Pub 3-12 (reference (bj)). This course is available to all and meets U.S. Army qualification requirements for the Additional Skill Identifier 5H.	5-day
Commander and Staff Radiological Accident Response Workshop	Provides worldwide deployable mobile training to promote a basic understanding of complex radiological accident response issues and to involve and/or integrate the Commander's staff.	3 days
Radiological Emergency Team Orientation Course	To provide worldwide deployable mobile training tailored to specific organization and/or installation radiological emergency response needs.	3 to 5 days
Medical Effects of Ionizing Radiation Field Course	Provides medical personnel with background material on human injury and combat effectiveness in a nuclear weapons detonation or accident scenario. Taught by both AFRRI and DNWS staff.	5 days

AP1. APPENDIX 1

SHIPBOARD RADIOLOGICAL MONITORING AND CONTROL

AP1.1. GENERAL

Monitoring for radioactivity is initially performed to identify radioactive material. If radioactivity is found, monitoring continues to determine the extent of the contaminated area. Personnel monitors identify contaminated personnel who require decontamination and prevent the spread of radioactive material to uncontaminated parts of the ship.

AP1.2. CONTROL OF CONTAMINATION

Standard damage control procedures should be used to limit damage and the spread of contamination. Fire boundaries shall be set and maintained to prevent the spread of fire. Additionally, at the outset of an accident, the ship should be maneuvered, if possible, so the wind is on the beam and carrying any contamination away from the ship.

AP1.2.1. Ship Monitoring. If contamination was released during the accident, it should be confirmed that parts of the ship thought to be uncontaminated are in fact “clean.” Monitors should be initially directed to check passageways at hatches, doors, ladders, and other locations where most personnel place their hands or feet. If contamination is found, its location should be marked for decontamination and re-monitoring. Contamination tracked or carried onto hard surfaces may be usually removed with soap and water, or by wiping with a clean, damp cloth. Then monitors should be directed toward the expected contaminated area. The boundaries of the contaminated area should be defined. Personnel should be advised of these boundaries and the procedures for crossing them, if required, for essential ship operations.

AP1.2.2. Air Monitoring. Airborne radiological monitoring shall be conducted to the extent instrumentation allows; however, many ships are not equipped with air samplers. Monitoring surfaces for loose surface contamination is the most reliable indicator of airborne contamination. If table AP11.T2., “Protective Devices for Emergency Workers as a Function of Surface Contamination,” is used, table values should be divided by 100 to correct for the higher resuspension factors (RFs) (0.001 in place of the 0.00001 used to develop the table) that may be expected from shipboard surfaces.

AP1.3. DECONTAMINATION STATION

The Decontamination Station shall usually be located at a compartment entrance. Most ships have insufficient RADIAC instruments to support more than one Decontamination Station. If potentially contaminated personnel are both above and below decks, routes to reduce their movement through clean areas should be established. Access to the Decontamination Station must be possible from both contaminated and uncontaminated areas. A shower and washbasin

should be designated for use in decontamination procedures. The wash facilities need not be in the immediate vicinity of the Decontamination Station, although such a location is preferable.

AP1.3.1. Until the absence of gamma radiation is confirmed by monitoring at the accident site, personnel should be monitored at the Decontamination Station with the Army, Navy/Portable Detector Radiation (AN/PDR)-27; Army, Navy/Portable, RADIAC, Special or Combination (AN/PDQ)-1; and the AN/PDR-56. Once the absence of gamma radiation is confirmed, use of the Army, Navy/Vehicular (Ground), RADIAC, Passive Detecting (AN/VDR)-2 and AN/PDQ-1 is no longer necessary. The use of earphones with RADIACs is required. This practice results in easier, more accurate monitoring. The user's attention is not focused on the RADIAC's meter movement, lessening the possibility of damage or inadvertent probe contamination during the monitoring process.

AP1.3.2. Personnel monitoring should include the front and backs of the hands, forearms, torso, and legs; a thorough check of the forehead, cheeks, nose, and mouth area; and finally, the ankles and feet. The preliminary readings in the areas most likely to be contaminated (for example, the hands and feet) should be made with the probe 1/8 to 1/16th inches from the monitored surface. If the person is not obviously contaminated, contact readings may be used for the remainder of the monitoring. If clothing is damp, inaccurate alpha contamination evaluation and detection is probable. Damp clothing should be removed and assumed to be contaminated, and the person's skin should be dried before evaluation for the presence of alpha contamination.

AP1.3.3. To conserve the expenditure of protective clothing, initial personnel monitoring must be performed before removing clothing. If no contamination or contamination below the acceptable emergency remaining levels of contamination is found on the protective clothing, it should be removed and placed in containers for clothing to be reused. Booties and gloves should be kept separate. If contamination levels greater than the acceptable levels are found, the protective clothing should be removed and placed in a container marked for contaminated clothing.

AP1.3.4. Personnel who had contamination on their protective clothing should be re-monitored after removing the protective clothing. If contamination is also on their personal clothing, the clothing should be removed and placed in a plastic bag labeled as contaminated clothing, and the fact should be noted in the Decontamination Station log. If contamination is on the skin, it may usually be removed by washing with non-abrasive soap and water. When washing, be sure not to puncture or abrade the skin through excess scrubbing. Following each washing, the skin should be thoroughly dried before monitoring to determine if the procedure removed the alpha contamination. Shampoo contaminated hair several times. Final monitoring should be made with the probe in contact with the skin. If two washings do not reduce contamination levels on the skin or hair, individuals should be referred to the Medical Department for further decontamination under medical supervision. Navy Bureau of Medicine and Surgery (BUMED) Instruction 6470.10A (reference (bk)), provides detailed guidance on personnel decontamination procedures and should be available to the Medical Department. When all contamination may not be removed, the residual level should be recorded in medical records and the Decontamination Station log, and the CO should be advised. Disposition of the

contaminated individual(s) shall be determined by the Medical Department cooperating with the BUMED.

AP1.4. <u>PROTECTIVE CLOTHING</u>

Any close-knit clothing should prevent contamination of the skin and provide protection from alpha contamination. If personal protective clothing is unavailable, coveralls are recommended for personnel entering the contaminated area to repair damage or perform decontamination operations. Openings in the clothing should be taped. When working in a wet environment, waterproof personal protective clothing should be used, if possible. Much of the protection provided by coveralls is lost if the material becomes soaked. Liquids soaking the clothing may carry contamination from the outer surface of the clothing. When removing contaminated clothing, care should be taken to prevent the outside of the clothing from contacting the skin.

AP1.5. <u>CLOTHING DECONTAMINATION</u>

The limited stock of protective clothing on board a ship may be exhausted rapidly during decontamination operations at sea. At sea, protective clothing and other launderable equipment may be laundered, if necessary, without damage to the equipment or the washing machine. Automatic washing machines should be clean and free of soap scum to prevent deposition of contamination. If decontamination agents are used, they should help keep washers free of contamination. After laundered items have completely dried, they must be checked for any remaining contamination. Items contaminated above acceptable emergency levels that do not show any appreciable contamination reduction after three successive launderings should be packaged for disposal as radioactive waste. Machines used to launder contaminated clothing should not be used for normal laundry until after they have been fully cycled empty, allowed to dry, and monitored to ensure they are free from contamination.

AP2. APPENDIX 2

SHIPBOARD FIREFIGHTING

AP2.1.1. Normal shipboard firefighting and damage control procedures shall apply to fires involving nuclear weapons with the following provisions:

AP2.1.1.1. Extinguishing the fire has priority.

AP2.1.1.2. Any weapons involved in, or near to, the fire should be cooled to the maximum extent that fire hoses allow.

AP2.1.1.3. Cooling should be continued after the fire is extinguished until the weapon is at ambient temperature.

AP2.1.2. The primary suppressant for a fire involving a nuclear weapon is narrow angle fog (wide angle fog for submarines). The propellants used in any weapon, conventional or nuclear, produce oxygen once ignited. They may not be extinguished with smothering agents, and some may cause heat retention within the weapon. This factor does not prevent the use of foam, carbon dioxide, Purple K (fire extinguisher), Aqueous Film Forming Foam, or other suppressants on aircraft fuel, Navy Standard Fuel Oil, or other petroleum fuel fires that involve a nuclear weapon.

AP2.1.3. Narrow angle fog or a firefighting agent should be sprayed over the complete length of the weapon(s) and/or both sides in a sweeping motion to cool the weapon and its HE contents until the weapon is at ambient temperature. When using foam to fight a fire surrounding an intact weapon, water should not be used to cool the weapon because water floats the foam away, which might allow the fire to re-ignite.

AP2.1.4. For below deck fires, all response personnel going below decks shall wear an SCBA (for example, Oxygen Breathing Apparatus and Scott Air Pack); top side personnel shall wear gas masks. Any firefighters initially responding without respiratory protection should be relieved as soon as possible. Repair party personnel shall wear protective clothing as specified in Naval Ships Technical Manual 079, Volume II, (reference (bl)). Involvement of a nuclear weapon does not require additional protective clothing for firefighting personnel. A backup firefighting team, with appropriate respiratory protection, shall be prepared to relieve, or rescue, teams at the scene.

AP2.1.5. During firefighting actions, the flow of potentially contaminated water should be noted and the wetted surfaces considered contaminated until they may be monitored. The flow of potentially contaminated water should be controlled to the extent possible, and dewatering operations should not be performed in port until testing determines if the water is contaminated. The best method of controlling the potentially contaminated water shall be ship and situation unique.

AP2.1.6. Fires involving nuclear weapons in enclosed shipboard spaces should be vented to the atmosphere as soon as practical to deplete the presence of toxic, caustic, and radioactive gases. When venting shipboard spaces, care should be taken to reduce the possible contamination of the exterior of the ship. In the event of a magazine accident, the normal exhaust system shall be secured and emergency ventilation procedures used. Portable blowers (for example, Red Devil Blowers) should be used if there is no installed blowout system. Recommend use of "snorkel hosing" with high capacity filters in conjunction with portable blowers to reduce possible contamination to portable blowers and ensure contamination in smoke exhausted is directed outside the skin of the ship. In all cases, the exhaust vent should be on the leeward side of the ship. After the fire is extinguished and when in port, unfiltered venting should not be done if it results in contamination being spread to nearby shore establishments or communities.

AP2.1.7. When extinguishing a fire involving a nuclear weapon, a reflash watch shall be set to provide an immediate response to any recurrence of the fire.

AP2.1.8. Potentially contaminated equipment used to fight the fire should be placed in a designated area until monitoring and necessary decontamination may be performed.

AP3. APPENDIX 3

RADIOLOGICAL MONITORING EQUIPMENT

Tables AP3.T1. through AP3.T5., below, show instruments and instrument sets.

Table AP3.T1. Alpha Survey Instruments

Alpha Survey Instruments				
Instrument	**Type**	**Scale**	**Indicator**	**Description**
AN/PDR-56	Scintillation	0 to 1000K, 4 ranges	CPM/17 cm^2	Small auxiliary probe provided for monitoring irregular objects. Mylar® probe face is very fragile; a puncture disables the instrument. Accompanying X-ray probe is calibrated for 17 kilo electron volt (keV) with associated meter scale from 0 to 10/m^2 in four ranges.
AN/PDR-77	Scintillation	0 to 999K CPM Digital Auto Ranging	100cm^2	See the instrument sets in table AP3.T3.
ADM-300 (with alpha probe AP-100A)	Scintillation	0 to 1.2M CPM	CPM; microcuries per meter squared (μCi/m^2); dintegrations per minute (DPM) per 100 cm^2	Portable alpha probe with three units of alpha measurement possible. High-range.
PRM-5	Scintillation	0 to 500K, 4 ranges	CPM	Portable, high- and low-range instrument for detecting plutonium contamination by measuring associated X-rays and low energy gamma radiation. Effective in inclement weather and much less subject to damage during field use.

Table AP3.T1. Alpha Survey Instruments, continued

Alpha Survey Instruments				
Ludlum Model 3 (See table AP3.T2., below)	Scintillation	0 to 400K	CPM	Portable, high- and low-range instrument. Similar in operation and function to the AN/PDR-60.
Ludlum Model 2220	Scintillation	0 to 500K, 4 ranges	CPM	Liquid crystal display and integral digital readout.

Table AP3.T2. Beta and Gamma Survey Instruments

Beta and Gamma Survey Instruments				
Instrument	**Type**	**Scale**	**Indicator**	**Description**
AN/VDR-2	GM	Digital Auto Ranging 0 to 9.99Gy/hr	Gy/hr	Portable beta and/or gamma survey instrument. Displays total accumulated dose or dose rate. (Replaces the AN/PDR-27 for Army applications.)
AN/PDQ-1	GM	1 Milliroentgen (mR)/h to 1000R/hr	R/hr	Uses ancillary probes; Detecting Head (DT)-680 for gamma/beta, DT-685 for beta probe interface, DT-681 for alpha, DT-682 for X-ray, DT-683 for Neutron Indicator, DT-684 for Neutron, DT-686 for Radiography.
AN/PDQ-2	GM	1 mR/hr to 1000 R/hr	R/hr	Uses ancillary probes; DT-680 for gamma/beta, DT-685 for beta probe interface, DT-681 for alpha, DT-682 for X-ray, DT-683 for Neutron Indicator, DT-684 for Neutron, DT-686 for Radiography.
AN/PDR – 78	Photo Multiplier	30 keV to 1.6 million electron volts (MeV)	Detector only. Uses an indicator light.	For underwater use to 300 feet.
Ludlum Model 3 (See table AP3.T1., above)	GM	0 to 200 mR/hr	mR/hr	Portable high- and low-range analyzer similar to AN/PDR-60. Probe 44-6 uses a GM tube to detect beta and gamma. Probe 44-9 detects low-energy gamma, 0 to 200 mR/hr.

Table AP3.T2. Beta and Gamma Survey Instruments, continued

AN/PDR-27	GM	0 to 500; 4 ranges	mR/hr	Low-range; suitable for personnel monitoring for beta and/or gamma emitters only. Not useful for alpha emissions. May saturate and read 0 in high radiation fields above 1,000 R/hr.
AN/PDR-43	GM	0 to 500; 3 ranges	R/hr	High-range; does not saturate in high radiation area. Readings in gamma fields other than Co-60 may be inaccurate to greater than 20 percent.
Army, Navy/General Utility, RADIAC, Passive Detecting-13	1 GM tube. Pin Diode / Prompt Gammas	.01-999 1 – 999	cGy/hr	As a rate meter, it measures residual gamma radiation. As a tactical dosimeter, it measures prompt radiation and residual dose.
ADM-300A	GM	Gamma: 10 to 10,000 Beta: 10 to 5	uR/hr R/hr uR/hr R/hr	Portable beta and/or gamma survey instrument (with beta probe-100 or beta gamma probe (BGP)-100). Built in beta gamma detection and monitoring capability without additional probes. High-range. BGP-100 may be up to 300 feet from the ADM-300. Saturation level of 100,000 R/hr.

Table AP3.T3. Instrument Sets

Instrument Sets	
Instrument	**Description**
AN/PDR-77 RADIAC Set	The AN/PDR-77 shall accept a maximum of eight different probes. Each probe is automatically recognized and has unique calibration information stored in non-volatile memory. The AN/PDR-77 comes with three probes. A $100cm^2$ Zinc Sulfur (ZnS) alpha probe, a two Geiger tube beta and/or gamma probe, and a 5-inch Sodium Iodide (NaI) low energy X-ray probe able to measure and find surface contamination levels of Plutonium and Americium (Am)-241 in $\mu Ci/m^2$. An accessory kit is available that contains a GM pancake probe and a 1" x 1.5" NaI micro-R probe.
Violinist II - FIDLER Instrument Set	Includes the FIDLER, high-voltage power supply, pre-amplifier, and the Violinist II. The Violinist II consists of a battery operated 256-channel analyzer and a pre-programmed microprocessor. When calibrated appropriately, it measures and determines surface contamination levels of Plutonium and Am-241 in $\mu Ci/m^2$.
Ranger	Includes the FIDLER/Violinist II and a position determining system. The microwave ranging system uses a base station, fixed repeaters, and mobile units. The mobile units send FIDLER radiation data to the repeaters and base station. Readings, contamination density, and isopleths are developed in near real-time. The microwave ranging system is limited to near line of sight. Dense vegetation, buildings, and hills may affect the ranging signal.

Table AP3.T4. Tritium Survey Instruments

Tritium Survey Instruments			
Instrument	**Scale**	**Indicator**	**Description**
T-446	0 to 10	Microcuries per cubic meter ($\mu Ci/m^3$)	Portable, automatic scale switching, trickle charger for Nickel Cadmium F-sized cells. With adapter kit, has urinalysis capability with 5-minute response. Filters particulate to .3 microns; not sensitive to smoke and paint fumes.
AN/PDR-73	0 to 10K; four ranges	$\mu Ci/m^3$	Portable air monitor comprising radiacmeter Intensity Measuring (IM)-245/Portable Detector Radiation, designed to detect gaseous radioactive contamination in the ambient air. The instrument is capable of continuous air sampling and is calibrated to read directly the level of tritium. Powered by twelve internal rechargeable "C" cell batteries or by 115 Alternating Current Volt, 60 Hz when in continuous use.
AN/PDR-74	0 to 100K; three ranges	$\mu Ci/m^3$	The portable RADIAC set contains an IM-246 air monitor to detect gases. Calibrated in terms

Table AP3.T4. Tritium Survey Instruments, continued

			of tritium activity but may be used to monitor other radio gases. Powered by "D" cell batteries. Alarm sounds at preset meter reading.

Table AP3.T5. Dosimeters

Dosimeters	
Instrument	**Capability and Limitations**
Self-Reading Ionization Chamber Dosimeter	Reusable device for measuring exposure to X-rays and gamma radiation. May provide false positive readings due to charge leakage and sensitivity to mechanical shock.
Non-Self-Reading Ionization Chamber Dosimeter	Reusable device for measuring exposure to X-rays and gamma radiation. May provide false positive readings due to charge leakage and sensitivity to mechanical shock. Requires separate reading device.
Film Badge	Provides measurement and permanent record of beta and gamma doses over a wide dosage range. Special neutron films are available. 10 percent dose accuracy depending on quality control (QC) during development. Sensitive to light, humidity, aging, and exposure to X-rays. Delay between exposure and dose reading due to processing time.
Thermo-Luminescent Dosimeter (TLD)	Measures gamma radiation dose equivalents up to 10,000 REM. Accurate to within a factor of two when the energy of the neutrons is unknown. After long periods of exposure, damaged or bent cards delay processing, static electric discharge causes spurious readings, and temperatures greater than 115°F reduce sensitivity. Delay between exposure and dose reading due to central processing of TLDs.
Electronic Personal Dosimeter	Detects and measures gamma, beta, and X-ray radiation. Most have an audible alarm as well as a digital readout. There are many models available on the market. Specifications vary from system to system.

AP4. APPENDIX 4

RADIOACTIVE MATERIALS, CHARACTERISTICS, HAZARDS, AND HEALTH CONSIDERATIONS

AP4.1. RADIOACTIVE MATERIALS

AP4.1.1. General. This appendix describes the characteristics, hazards, and health considerations of plutonium, uranium, tritium, and thorium (Th) (acronym used in this Manual when referring to a formula). It assumes that the elements are in their pure, weapons-grade form and no fission has occurred.

AP4.1.2. Plutonium and Americium. Plutonium is a heavy metal with a shiny appearance similar to that of stainless steel when freshly machined. After short exposure to the atmosphere, it oxidizes to a dark brown or black color. Americium is a daughter product of plutonium decay and is not considered as a separate element in this Manual.

AP4.1.2.1. Radiological Characteristics. Plutonium and americium are primarily alpha emitters except Pu-241, which is primarily a beta emitter.

Table AP4.T1. Radiological Characteristics of Plutonium and Americium

Isotope	Primary Particle Emitted	Half-Life in Years
Pu-239	alpha	24,100
Pu-240	alpha	6570
Pu-241	beta	14.4
Pu-242	alpha	376,000
Am-241	alpha	432

AP4.1.2.1.1. Weapons-grade plutonium (including americium) emits two detectable photons: a 17 keV X-ray and a 60 keV gamma ray. The 17 keV X-ray may be shielded after 5 days of dry weather or after a rain as the contamination migrates into the ground. The 60 keV gamma ray (provided by Am-241) continues to be detectable.

AP4.1.2.1.2. A critical mass may be obtained from several hundred grams or more of plutonium, depending on the geometry of the container and the material surrounding or near the mass. Recovery personnel should consult EOD technical publications and with the DOE/NNSA ARG to ensure that the possibility of aggregating a critical mass of recovered material is considered and avoided.

AP4.1.2.2. Hazards and Health Considerations

AP4.1.2.2.1. When dispersed in an accident, plutonium is considered the most significant radiological hazard. The primary hazard results from inhalation and later deposition in the lungs. From the lung, plutonium enters the bloodstream and is deposited in the bone and

liver. Bone deposition may lead to bone diseases many years later. Due to its extremely long physical and biological half-lives, plutonium is held within the body for a lifetime. The hazards from americium are comparable to those of plutonium.

AP4.1.2.2.2. Plutonium is eliminated from the body extremely slowly. If a person contaminated internally is given prompt medical treatment with a chelating agent, plutonium retention may be significantly reduced.

AP4.1.2.2.3. A properly fitted respirator and standard personal protective clothing may provide adequate protection for plutonium contamination expected at an accident site.

AP4.1.2.2.4. Smoke from a fire or explosion involving plutonium may carry particles of plutonium into the air, causing an inhalation hazard.

AP4.1.3. Uranium. Uranium is a heavy metal that occurs in nature in significant quantities. When newly machined, it has the appearance of stainless steel. After short exposure to the atmosphere, it oxidizes to a golden-yellow color and from that into black.

AP4.1.3.1. Radiological Characteristics

Table AP4.T2. Radiological Characteristics of Uranium

Isotope	Primary Particle Emitted	Half-Life in Years
U-238	alpha	4,500,000,000
U-235	alpha	710,000,000
U-234	alpha	2,150,000

AP4.1.3.1.1. Types of Uranium. Three forms of uranium have been used in nuclear weapons: natural uranium, DU, and enriched uranium.

AP4.1.3.1.1.1. Natural Uranium. When uranium is separated from its ore, the resulting mixture of uranium is natural uranium. It is almost pure U-238. Natural uranium in metal form is called tuballoy.

AP4.1.3.1.1.2. DU. Uranium with some amount of its U-235 extracted is DU. It is also called U-238.

AP4.1.3.1.1.3. Enriched Uranium. Enriched uranium contains more than the naturally occurring amount of U-235. It is enriched through chemical and metallurgical processes, and may be used in nuclear weapons to produce a yield.

AP4.1.3.1.2. A critical mass may be obtained from several hundred grams or more of uranium, depending on the geometry of the container and the material surrounding or near the mass. Recovery personnel should consult with EOD technical publications and with the DOE/NNSA ARG to ensure that the possibility of aggregating a critical mass of recovered material is considered and avoided.

AP4.1.3.2. Hazards and Health Considerations

AP4.1.3.2.1. Radiological hazards associated with any uranium isotope are usually less severe than those of plutonium. If uranium is taken internally, a type of heavy metal poisoning may occur. Lung contamination due to inhalation may cause a long-term hazard.

AP4.1.3.2.2. When involved in fire, uranium melts and forms a slag, with only a part of it oxidizing; however, the possibility of hazardous airborne contamination exists, and protective measures must be taken to prevent inhalation or ingestion. A protective mask and standard personal protective clothing shall protect personnel against levels of uranium contamination expected at an accident site. If multiple weapons were involved in a severe fire in which the warheads may have melted, there is a potential for critical geometry to be achieved if the U-238 melted and pooled.

AP4.1.4. Tritium. Tritium is a radioactive isotope of hydrogen and diffuses very rapidly in the air. The diffusion rate is measurable even through very dense materials such as steel. Tritium combines chemically with several elements. This chemical reaction produces heat. Like normal hydrogen, tritium may combine in a combustive reaction with air, forming water and releasing large amounts of heat. Metals react with tritium in two ways: plating, the deposition of a thin film of tritium on the surface of the metal; or hydriding, the chemical combination with the metal. In either case, the surface of the metal becomes contaminated. In a fire, tritium combines spontaneously with oxygen in the air and also replaces ordinary hydrogen in water or other hydrogenous material (grease or oil), causing these materials to become radioactive. Metal tritides deposit in the lung. The tritium involved is bound with the metal. Only after an extended period of time is the tritium available for absorption and elimination through the urine. The low energy betas continue to deposit energy in lung tissue until the material is removed from the lung.

AP4.1.4.1. Radiological Characteristics. Tritium emits a weak beta particle and decays into a stable helium-3 atom.

Table AP4.T3. Radiological Characteristics of Tritium

Isotope	Primary Particle Emitted	Half-Life in Years
T	beta	12.26

AP4.1.4.2. Hazards and Health Considerations

AP4.1.4.2.1. Tritium is a health hazard when personnel are engaged in specific weapon RSPs, when responding to an accident that occurred in an enclosed space, and during accidents that occurred in rain, snow, or a body of water.

AP4.1.4.2.2. In its gaseous state, tritium is not absorbed by the skin to any significant degree. The hazardous nature of tritium is due to its ability to combine with other materials. HTO is readily absorbed by the body by inhalation and absorption through the skin. The

radioactive water entering the body is chemically identical to ordinary water and is distributed throughout the body tissues. Tritium that has plated on a surface or combined chemically with a material is a contact hazard.

AP4.1.4.2.3. The body usually eliminates and renews 50 percent of its water in about 8 to 12 days. This biological half-life varies with the fluid intake. Since HTO is water, its time in the body may be significantly reduced by increasing the fluid intake. Under medical supervision, the biological half-life may be reduced to 3 days. Without medical supervision, a recommended procedure is to have the patient drink 1 quart of water within 1-half hour of exposure. Thereafter, maintain the body's water content by imbibing the same amount excreted until medical assistance is obtained.

AP4.1.4.2.4. An SCBA and protective clothing shall protect personnel against tritium for a short time. A filter mask offers no protection.

AP4.1.5. Thorium. Thorium is a heavy, dense gray metal that is about three times as abundant as uranium. Thirteen isotopes are known, with atomic masses ranging from 223 to 235.

AP4.1.5.1. Radiological Characteristics. Th-232 is the principal isotope. It decays by a series of alpha emissions to radium-225. Th-232 is not fissionable but is used in reactors to produce fissionable U-233 by neutron bombardment. A non-nuclear property of thorium is that, when heated in air, it glows with a dazzling white light.

Table AP4.T4. Radiological Characteristics of Thorium

Isotope	**Primary Particle Emitted**	**Half-Life in Years**
Th-223 to Th-235	alpha	14,100,000,000

AP4.1.5.2. Hazards and Health Considerations. Thorium presents both a toxic and radiological hazard.

AP4.1.5.2.1. Toxicologically, thorium causes heavy metal poisoning similar to lead or the uranium isotopes.

AP4.1.5.2.2. Thorium accumulates in the skeletal system where it has a biological half-life of 200 years.

AP4.1.5.2.3. A properly fitted respirator and standard personal protective clothing shall protect personnel against levels of thorium contamination expected at an accident site.

AP4.2. FISSION PRODUCTS

The materials considered so far are used in weapons in pure forms and in combinations with other elements. Due to weapon design, the likelihood of a nuclear detonation because of an

accident is low. If fission occurs, the products of the reaction may pose a severe hazard. In general, fission products are beta and gamma emitters and are hazardous, even when external to the body. It is difficult to predict and estimate the quantity of fission products since the amount of fission is unknown and, to further complicate the situation, the relative isotopic abundances change with time as the shorter-lived radioisotopes decay. The hazard may be estimated by beta and gamma monitoring.

AP4.3. <u>GAMMA MONITORING</u>

When approaching a nuclear weapon involved in an accident, always survey for gamma radiation because some fission products may be present. Observe the maximum permissible exposure (MPE) listed in subparagraph AP4.3.1.4.

AP4.3.1. <u>Off Scale Gamma Survey</u>. If the gamma survey instrument being used has a meter capable of indicating a maximum of 3 R/hr (or less) and the meter goes off scale, do not enter the area because the actual radiation level is unknown.

AP4.3.2. <u>Saturated Gamma Survey Instrument</u>. Many gamma survey instruments become saturated when placed in a strong field. A saturated instrument may indicate a false low or zero reading. When approaching a radiation field, begin monitoring in a low exposure area and then move toward the higher exposure area. If the meter reading drops using this survey technique when approaching the high exposure area, it is likely that the meter electronic processors are becoming saturated from too much data load (e.g., too much radiation).

AP4.3.3. <u>Inverse Square Law</u>. The radiation intensity emitted from a given point source is inversely related to the distance from that source. If a dose rate, R1, is taken at distance, D1, from the source, a second unknown dose rate, R2, may be computed for a second (different) distance, D2, using the equation shown in figure AP4.F1., below:

Figure AP4.F1. <u>Inverse Square Law</u>

R2 = R1 X ((D1/D2) squared)

R1 = Dose rate at distance D1 from a point source of gamma.
R2 = Unknown dose rate at distance D2 from a point source of gamma.
D1 = Known distance from point source of gamma where R1 was measured.
D2 = Known distance from point source of gamma for which R2 shall be computed.

AP4.3.4. <u>Stay Time</u>. No individual less than 18 years of age or women known to be pregnant shall be occupationally exposed to radiation in excess of that allowed to any individual in the general population. The MPE for an individual in a given radiation field before reaching a predetermined maximum cumulative dose is computed as follows in figure AP4.F2. Use the highest maximum reading to determine stay time:

Figure AP4.F2. Stay Time

$$T = D/R$$

T = Time of exposure to ionizing radiation expressed in hours or decimal fractions thereof.
R = Dose rate expressed in R/hr or mR/hr, as determined from the beta/gamma instrument.
D = The predetermined maximum yearly cumulative dose:
0.5 REM
500 mRem: non-occupational (general public)
5 REM: occupational dose limit
25 REM: to save valuable property
100 REM: to save lives
Other: as decided by the OSC consistent with operational military consideration.

AP4.3.5. Cumulative Dose. The dose an individual receives over a specific period of time in a given radiation field is computed as follows in figure AP4.F3.:

Figure AP4.F3. Cumulative Dose

$$D = R(T)$$

D = Cumulative dose received expressed in Rs or mRs.
R = Dose rate expressed in R/hr or mR/hr, as determined from the beta and/or gamma instrument.
T = Time of exposure to ionizing radiation expressed in hours or decimal fractions thereof.

AP5. APPENDIX 5

RADIATION DETECTION AND MEASUREMENT

AP5.1. OVERVIEW

AP5.1.1. Quantitative measurements of radioactive contamination in the field are extremely difficult to find. Particles having short ranges, such as alpha and low energy beta radiation, are significantly and incalculably affected by minute amounts of overburden, for example, dust or precipitation; therefore, detection rather than measurement is a more realistic goal for alpha-beta surveys. More penetrating radiations, such as gamma and higher energy X-rays, are affected less by such overburden; however, these elements require special attention to field calibration techniques to convert meter readings to contamination estimates.

AP5.1.2. Field survey of uranium is best accomplished by measuring X-rays in the 60 to 80 keV range emitted by uranium isotopes and daughters. For plutonium, the best technique is to detect the accompanying contaminant Am-241, which emits a strong 60 keV gamma ray. Knowing the original assay and the age of the weapon, the ratio of plutonium to americium may be computed accurately and so the total plutonium contamination may be determined.

AP5.1.3. Many of the factors that may not be controlled in a field environment may be managed in a mobile laboratory that may be brought to an accident site. Typically, the capabilities include gamma spectroscopy, low background counting for very thin alpha- and beta-emitting samples, and liquid scintillation counters for extremely low energy beta emitters such as tritium.

AP5.2. GENERAL

AP5.2.1. Scope. This appendix provides detailed information on the instrumentation and associated techniques used to perform radiological monitoring at an accident involving the release of radioactive material. This appendix is not intended to serve as a "user's manual" for the various instruments; however, it includes sufficient detail to provide an understanding of the limitations of field measurement techniques and provides for proper application and the use of techniques in an emergency. For completeness, some basic characteristics of different kinds of radiation are included. Throughout this appendix, the word "radiation" refers only to nuclear radiation found at a nuclear accident.

AP5.2.2. Detection Versus Measurement

AP5.2.2.1. Nuclear radiation is not easy to detect. Radiation detection is always a multi-step, highly indirect process. For example, in a scintillation detector, incident radiation excites a florescent material that de-excites by emitting photons of light. The light is focused onto the photocathode of a photomultiplier tube that triggers an electron avalanche. The electron shower produces an electrical pulse that activates a meter read by the operator. Not surprisingly, the

quantitative relationship between the amount of radiation actually emitted and the reading on the meter is a complex function of many factors. Since those factors may only be controlled well within a laboratory, only in a laboratory setting may true measurements be made.

AP5.2.2.2. On the other hand, detection is the qualitative determination that radioactivity is or is not present. Although the evaluation of minimum levels of detectability is a considerable quantitative challenge for instrumentation engineers, the task of determining whether a meter records anything is considered much easier than the quantitative interpretation of that reading.

AP5.2.2.3. The discussion in subparagraphs AP5.2.2.1. and AP5.2.2.2. suggests that the same equipment may be used for either detection or measurement. In fact, detectors usually have meters from which numbers may be extracted; however, to the extent that the user is unable to control factors that influence the readings, those readings must be recognized as indications of the presence of activity (detection) only and not measurements.

AP5.2.2.4. In the discussions that follow in sections AP5.3. through AP5.7., personnel must be aware of the limitations imposed by field conditions and their implications on the meaning of readings taken; therefore, instructions shall carefully indicate the extent to which various instruments may be used as measurement devices or may be used only as detectors.

AP5.3. TYPES OF RADIATION

AP5.3.1. General. Four major forms of radiation are commonly found emanating from radioactive matter: alpha, beta, gamma, and X-radiation. The marked differences in the characteristics of these radiations strongly influence their difficulty in detection and, consequently, the detection methods used.

AP5.3.2. Alpha. An alpha particle is the heaviest and most highly charged of the common nuclear radiations. As a result, alpha particles very quickly give up their energy to any medium through which they pass, rapidly coming to equilibrium with, and disappearing in, the medium. Since nearly all common alpha radioactive contaminants emit particles of about the same energy, 5 MeV, some general statements may be made about the penetration length of alpha radiation. Generally speaking, a sheet of paper, a thin layer (a few hundredths of a millimeter) of dust, any coating of water or less than 4 cm of air are sufficient to stop alpha radiation. As a result, alpha radiation is the most difficult to detect. Moreover, since even traces of such materials are sufficient to stop some of the alpha particles and thus change detector readings, quantitative measurement of alpha radiation is impossible outside of a laboratory environment where special care may be given to sample preparation and detector efficiency.

AP5.3.3. Beta. Beta particles are energetic electrons emitted from the nuclei of many natural and manmade materials. Being much lighter than alpha particles, beta particles are much more penetrating. For example, a 500 keV beta particle has a range in air that is orders of magnitude longer than that of the alpha particle from plutonium, even though the latter has 10 times more energy; however, many beta-active elements emit particles with very low energies. For example, tritium emits a (maximum energy) 18.6 keV beta particle. At this low an energy,

beta particles are less penetrating than common alpha particles, requiring very special techniques for detection.

AP5.3.4. Gamma and X-Radiation. Gamma rays are a form of electromagnetic radiation and, as such, are the most penetrating of the four radiations and easiest to detect. Once emitted, gamma rays differ from X-rays only in their energies, with X-rays usually lying below a few hundred keV. As a result, X-rays are less penetrating and harder to detect; however, even a 60 keV gamma-ray has a typical range of a hundred meters in air and might penetrate a centimeter of aluminum. In situations in which several kinds of radiations are present, these penetration properties make X-ray and/or gamma ray detection the technique of choice.

AP5.3.5. Radiations from the Common Contaminants. Table AP5.T1., below, lists some of the commonly considered radioactive contaminants and their primary associated radiations.

Table AP5.T1. Commonly Considered Radioactive Contaminants and Their Primary Associated Radioactive Emissions

	Alpha	Beta	Gamma	X-rays
Am-241	X		X	X
H-3		X		
Pu-239	X			X
Th-228	X			X
Th-230	X			X
Th-232	X			X
U (naturally occurring)	X	X		X
U-235	X			X
U-238	X	X		X

AP5.4. ALPHA DETECTION

AP5.4.1. Because of the extremely low penetration of alpha particles, special techniques must be used to allow the particles to enter the active region of a detector. In field instruments such as the AN/PDR-56, AN/PDR-77, and ADM-300, an extremely thin piece of aluminized Mylar® film is used on the face of the detector probe to cover a thin layer of florescent material. Energy attenuation of the incident alpha radiation by the Mylar® is estimated to be less than 10 percent; however, use of this film makes the detector extremely fragile. Thus, contact with literally any hard object, such as a blade of hard grass, may puncture the film, allowing ambient light to enter the detection region and overwhelm the photomultiplier and meter. (Even sudden temperature changes have been shown to introduce stresses that may destroy a film.) In addition, contact with a contaminated item might transfer contamination onto the detector; thus, monitoring techniques must be used that keep the detector from contacting any surface (however, recall that the range of the alpha radiation is less than 4 cm in air). This requirement to be within a few centimeters of monitored locations without ever touching one makes using such detectors

impractical except for special, controlled situations (for example, monitoring individuals at the hot line or air sampler filters).

AP5.4.2. The sensitivity (minimum detectability) of an alpha detector is not dictated by the ability of the active region of the detector to respond to the passage of an alpha particle; counting efficiency for alpha detectors is 25 to 60 percent of the alpha particles from a distributed source that reach the detector probe. Fortunately, alpha detectors in good repair usually have a fairly low background interference. There are few counts from cosmic and other spurious radiation sources and state-of-the-art instruments easily eliminate most electronic noise. As a result, count rates in the order of a few hundred CPM are easily detectable on instruments such as the AN/PDR-77. However, the detectability is dominated by the ability of the alpha particles to get into the active region of the detector, which depends on such factors as overburden (amount of dust and/or moisture lying between the alpha emitters and the detector) and the proximity of the detector to the emitters.

AP5.4.3. In demonstrations conducted in the laboratory, a sealed alpha source (Am-241) was monitored with a well maintained AN/PDR-60 alpha probe and meter. Dust and water were sprinkled onto the source and changes noted. It was found that a drop of water, a heavy piece of lint, or a single thickness of tissue paper totally eliminated all readings. A light spray of water, comparable to a light dew, reduced readings by 40 to 50 percent. A layer of dust that was just visible on the shiny source had minimal effect on the count rate; however, a dust level that was only thick enough to show finger tracks reduced readings by 25 percent. These simple demonstrations reinforced the knowledge that detecting alpha particles in any but the most ideal situations is most problematical. The leaching or settling of contaminants into a grassy area or the dust stirred up by vehicular traffic on paved areas significantly decreases or eliminates alpha detection.

AP5.5. BETA AND/OR GAMMA DETECTION

AP5.5.1. Gamma rays and high energy (>l MeV) beta particles are highly penetrating radiations. As a result, the major problems listed for alpha detection do not apply. Furthermore, at the energies of concern in nuclear weapon accidents, detection efficiency for most detectors is relatively high. Thus, beta and/or gamma detection is relatively easy.

AP5.5.2. From a detection standpoint, unfortunately, high energy beta and gamma radiation are not produced in the most likely radioactive contaminants (for example, plutonium, uranium, or tritium). Rather, the major potential source of beta and/or gamma emitters is from fission product radioelements that might be produced in the extremely unlikely event of a partial nuclear yield. Beta and/or gamma detection, therefore, has no quantitative use in determining the extent of plutonium or uranium contamination but is used as a safety precaution to determine any areas containing hazardous fission products.

AP5.5.3. Common gamma detectors are scintillation detectors (using scintillation media different from that described in section AP5.4. for alpha detection) or gas ionization type detectors (ion chambers, proportional counters, or GM counters). In either case, the high

penetrability of the radiation allows the detector to have reasonably heavy aluminum, beryllium, or plastic windows and to be carried at a 0.5 to 1.0 m height. Dimensions of the active region of the detector (for example, the thickness of a scintillation crystal) may be made larger to increase sensitivity. Because the detection efficiencies are reasonably insensitive to energies in the energy regions of interest, the detectors may be calibrated in terms of dosage (RAD or REM), rather than in terms of activity. This practice reflects the common use for beta and/or gamma detectors.

AP5.5.4. The Ludlum Model 3 with a Ludlum 44-9 “pancake” (GM) probe is a typical beta and/or gamma detector. Minimum detectability for such a detector is a radiation field that produces readings two to three times greater than the background (no contaminant, natural radiation plus electronic noise) reading. Customarily, this corresponds to a few hundredths of a mRem per hour. All beta and/or gamma survey instruments are listed in Appendix 3.

AP5.6. X-RAY DETECTION

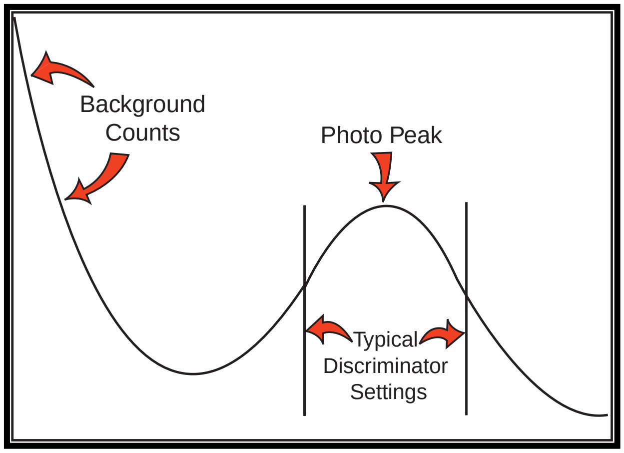
AP5.6.1. For low energy (l7 to 100 keV) X-rays, the scintillation detector is again the instrument of choice. Window thickness is again a factor, though not as much as with alpha particles. For example, the half-thickness for absorption of 17 keV X-rays in aluminum is 0.4 mm and in air is about 4 m. These factors increase rapidly with energy. For 60 keV X-rays, the distances become 2.5 cm and 190 m, respectively. Thus, for X-rays above 15 keV, an X-ray detector may be held at a comfortable height (0.5 m) above the contaminated surface.

AP5.6.2. The size of an electronic pulse produced by an X-ray in a scintillation-type detector is proportional to the energy of the X-ray. This has a most important application, commonly called pulse-height discrimination. Because of the relatively low (tens of keV) energy of the X-rays of interest, an X-ray detector and its electronics must be quite sensitive. Unfortunately, such a detector is sensitive also to the myriad radiations from natural sources and to common low-level electronic noise. The result is a deluge of signals that overwhelm the pulses from sought after X-rays. To remove the unwanted signals, circuitry is installed in the meter to ignore all pulses with sizes that lie below a user-selectable lower level (threshold). In cases of high (natural) background, it is also useful to discard all pulses with sizes greater than a user-selectable upper level. The accepted pulses, therefore, are only those from the desired X-rays and that small amount of background that happens to fall in the same pulse size region.

AP5.6.3. Unfortunately, pulse-height discrimination is not as “easy” as described above. In fact, the signals from the detection of identical X-rays are not identical in size; rather, a large number of such detections produce a distribution of pulse sizes that cluster about a mean pulse size. If one sets the lower-level discriminator slightly below and the upper level slightly above the mean pulse size, a large fraction of the desired pulses are eliminated, resulting in a significant decrease in detector response; however, setting the discriminator levels far from the mean admits too much background, masking the true signals. (See figure AP5.F1., below.) Thus, the setting of discriminator levels requires a qualitative judgment that may significantly affect the readings from a given contamination. Furthermore, since the width of the pulse size distribution depends in a most complicated way on the condition and age of the detector, it is impossible to specify

one setting for all similar instruments. Rather, techniques have been developed to establish the sensitivity of a given detector, with its electronics, in a field environment. This technique is described in section AP5.7., below.

Figure AP5.F1. <u>Spectral Plot</u>



AP5.6.4. Figure AP5.F1., above, shows the normal spread of pulses from a mono-energetic source mixed with a typical background spectrum and shows typical discriminator settings.

AP5.6.5. In spite of the complications detailed in paragraph AP5.6.3., the scintillation detector is still the instrument of choice for detecting X-ray emitting radioactive contamination. One such detector is the FIDLER. A FIDLER (4 inches x 1 mm. NaI [T1]) probe, in good condition, mated to a Ludlum 2220 electronics package, may detect 60 keV activity as low as 0.2 $\mu Ci/m^2$. In a typical weapon grade mix for a medium aged weapon, this mix should correspond to about 1 microcurie of plutonium per square meter. Furthermore, since the X-rays are much less affected by overburden than are alpha particles, the radiation monitor has much better control of the factors that influence its meter readings. As a result, the monitor may make quantitative measurements of the amount of radiation and infer the actual amount of contamination with far greater confidence than with any other field technique.

AP5.7. <u>DETECTION OF URANIUM AND PLUTONIUM</u>

AP5.7.1. Although uranium and plutonium are alpha emitters, they and their daughters also emit X-rays; therefore, as discussed above in section AP5.6., the instrument of choice for detecting these elements is a scintillation detector.

AP5.7.2. Detecting uranium contamination is fairly straightforward. Among the radiations emitted in the decay of U-235 and its daughters is an 80 keV X-ray. Setup and field calibration of the detector as described in this appendix allows measurement of the X-ray activity per square

meter and thus evaluation of the uranium contamination. Confidence in the accuracy of these measurements is in the 11- to 25-percent range.

AP5.7.3. Detecting plutonium is somewhat more complicated. Pu-239 and its daughters emit a 17 keV X-ray that may be detected with a FIDLER detector. However, absorption of that relatively low energy X-ray by overburden plus interference by background signals in the same range as the desired X-ray make measuring the 17 keV a highly uncertain technique. Plutonium contamination may be determined more confidently through the following, indirect technique:

AP5.7.3.1. Weapons grade plutonium contains several isotopes. In addition to the dominant Pu-239, there is always a trace amount of Pu-241. Pu-241 beta decays, with a half-life of 14.35 years, to Am-241. Am-241 subsequently decays with the emission of a 60-keV X-ray which, like the 80-keV X-ray of uranium, is relatively easy to detect under field conditions. Thus, a most sensitive technique for detecting weapons grade plutonium is to detect the contaminant Am-241 and infer the accompanying plutonium.

AP5.7.3.2. Clearly, this technique requires more information than the direct detection of radiation from the most plentiful isotope, such as knowledge of the age and original assay of the weapon material; however, decay times, weapon age, and assay are known or controllable quantities, while overburden and its effect on alpha and low energy X-rays are not. Thus, the safeguards community has standardized on detecting plutonium through its americium daughter.

AP5.7.4. To ease the computations and calibration needed to measure plutonium contamination by X-ray detection in the field, the LLNL has produced a series of utility codes called the Hotspot Codes, available for IBM®-compatible computers in both Disk Operating System and Windows 95/98/NT versions. The Hotspot Codes include an interactive, user-friendly utility routine called FIDLER that steps a user through the process of calibrating an X-ray detector. The FIDLER code is applicable to any X-ray detector if the full calibration technique, involving a known americium calibration source, is used.

AP5.7.5. Particularly useful in the FIDLER code is the provision to aid in the measurement of the geometric factor for any specific detector. Measurements made at the Ballistic Research Laboratory and the LLNL have shown that the value of K(h) for h = 30 cm may vary from less than 0.4 m^2 to more than l.0 $m^{2,}$ apparently depending on external configuration and subtle internal details of a particular FIDLER probe. For this reason, the FIDLER code contains both a detailed laboratory procedure and a field expedient procedure for determining K(h) for a given detector. The code also provides a default value of 0.5 $m^{2.}$ This value was chosen to give a relatively conservative reading indication of contamination per count rate.

AP5.8. <u>LABORATORY TECHNIQUES</u>

Laboratory procedures are necessary to quantitatively measure radiation contamination. For this reason, mobile laboratories are available within the Department of Defense and the DOE/NNSA for deployment to an accident site. Although specific instrumentation shall vary, the types of

laboratory analyses fall into three categories: gamma and X-ray spectroscopy, alpha-beta counting, and liquid scintillation.

AP5.8.1. Gamma and X-Ray Spectroscopy. The major tools involved in gamma and X-ray spectroscopy are a reasonably high-resolution gamma and/or X-ray detector (such as a High Purity Germanium or selectively high resolution NaI) and a multi-channel analyzer. With this equipment it is possible to accurately determine the energies of the gamma and X-rays emitted by a contaminated sample. Usually, spectroscopic techniques are not used for absolute measurements of amount of contamination (i.e., microcuries (μCi)) in a sample; however, by adjusting for the energy dependence of detection efficiencies and using standard spectral unfolding techniques, the relative amounts of various isotopes present in the contaminant may be determined accurately. Recalling the discussions in sections AP5.6. through AP5.8., immediate application may be seen for such information. For example, spectroscopy allows determination of the relative abundance of Am-241 to Pu-239, resulting in accurate calibration of the most sensitive (FIDLER) survey techniques.

AP5.8.2. Alpha and/or Beta Counting

AP5.8.2.1. Another laboratory technique, alpha and/or beta counting, results in a reasonably accurate determination of the absolute amount of contamination in a sample. Two types of counters are common and both are fairly simple in principle. In one, a reasonably sensitive alpha and/or beta detector, such as a thin layer of ZnS mated to a photomultiplier tube, is mounted in a chamber that is shielded to remove background radiation. A sample, made very thin to reduce self-absorption, is inserted into the chamber under the detector. In some apparatus, air is evacuated from the chamber to eliminate air absorption of the radiation. The count rate is then measured. Knowing the geometry of the experiment allows translating the count rate to an absolute evaluation of sample activity.

AP5.8.2.2. Another alpha and/or beta technique involves gas-flow proportional counters. In these devices, a sample is inserted into the chamber of a proportional counter. Any emitted radiation causes ionization of the gas in the counter that is electronically amplified and counted.

AP5.8.2.3. In both types of alpha and/or beta counters, the most difficult, sensitive part of the experiment is the sample preparation. To achieve absolute measurements of activity, radiation absorption must be reduced by the overburden caused by the sample itself. Techniques used include dissolving the sample onto a sample holder; evaporation of the solvent leaves a very thin, negligibly absorbing sample. Clearly, quantitative alpha and/or beta counting is a difficult, time-consuming process.

AP5.8.3. Liquid Scintillation

AP5.8.3.1. In a few cases, notably in detecting beta radiation from tritium, the energy of the radiation is so low, and the resultant absorption is so high, that solid samples may not be used for quantitative analysis. In these cases, dissolving the contaminant in a scintillating liquid may be possible. Glass vials of such liquid may then be placed in a dark chamber and the resulting scintillation light pulses counted using photomultipliers.

AP5.8.3.2. Again, the outstanding difficulty with this process is in the sample preparation. Scintillation liquids are extremely sensitive to most impurities that tend to quench the output of light pulses. As a result, the most common technique for liquid scintillation sample gathering is to wipe a fixed area (typically 100 square centimeters) of a hard surface in the contaminated area with a small piece of filter paper. The cloth may then be immersed totally in scintillation liquid in such a way that subsequent light emission shall be visible to one of the photomultipliers in the analysis chamber. Alternatively, the filter paper may be replaced by a special plastic material that dissolves in scintillation liquid without significantly quenching light output. In either case, the technique works best when the contamination is gathered without large amounts of local dirt, oil, etc.

AP6. APPENDIX 6

AREA AND RESOURCE SURVEYS

AP6.1. GENERAL

Extensive radiation predictions and surveys shall be required to identify and characterize the area for decontamination and to develop and evaluate remediation plans. During the initial hours of the response, available radiation survey instruments and monitoring personnel for survey operations shall be limited. Determining whether contamination was released by the accident must be done immediately. If a release occurred, priority must be given to those actions required to identify and reduce the hazards to people. These actions include identifying the affected area (perimeter survey) to allow identification of potentially contaminated people. Each successive survey operation shall be based in part on the information gained from earlier operations. Initial radiation surveys may be based on ARAC information, if available, or only on the knowledge that contamination is dispersed downwind. Later surveys shall be based on the initial survey data and AMS plots. Days shall be required to complete comprehensive contamination characterization.

AP6.2. GENERAL SURVEY PROCEDURES

Selection of instrumentation, identification of the edge of contamination, determination of the location of measurements made, and data recording procedures are similar for most survey operations.

AP6.2.1. Selection of Instrumentation

AP6.2.1.1. Alpha Instruments. Instruments that detect alpha radiation may detect lower levels of contamination than instruments that detect low energy gamma radiation. Under field conditions, however, alpha radiation has an extremely short detection range and its detection may be blocked by nothing more than surface moisture. Decaying alpha radiation emits low-level gamma radiation and may be detected with the ADM-300 with X-ray probe under dust or morning dew conditions. The fragility of the Mylar® probe face on most alpha instruments combined with the short detection range of alpha radiation results in a high rate of instrument failure when field use requires measurement of contamination on rough ground or other irregular surfaces. Alpha instruments should therefore be used primarily for personnel and equipment monitoring at the hot line. Field use should be limited to only smooth surfaces like pavement and buildings.

AP6.2.1.2. Low Energy Gamma Instruments. Instruments capable of detecting the low energy gamma ray and X-ray radiations from plutonium, and its americium daughter, may be used to detect contamination. Low energy gamma and/or X-ray instruments are not subject to damage by surfaces being monitored and field surveys may be rapidly conducted. Low energy gamma instruments are, therefore, the recommended instruments for field surveys of plutonium

contamination, while the SPA 3 probe is more useful for measuring the medium energy gamma radiation from uranium. For the best detection efficiency, low energy X-ray surveys should be conducted before any rainfall, and during the first five days after the accident before part of the measurable low energy radiation present is screened by the plutonium migrating into the soil. The best instrumentation for low energy gamma and/or X-ray surveys uses FIDLER probes, which are not usually available until the specialized teams arrive. The type and amount of low energy gamma and X-ray radiation present depends on the age of the plutonium. Many weapons contain plutonium more than 10 years old, resulting in higher signal strengths for the same level of contamination as that produced by a "new" weapon; therefore, the age of the plutonium and projected signal strength should be determined as soon as possible. The age of the plutonium in a weapon may be obtained from the DOE/NNSA ARG.

AP6.2.2. Perimeter Contamination Levels. When alpha instruments are used to establish the perimeter, readings of 500 CPM are recommended for instruments with 60-cm probe areas and 105 CPM for instruments with 17-cm probes used to mark the perimeter. When low energy gamma and/or X-ray instruments are used to establish the perimeter, a reading of twice the background is recommended to mark the perimeter. FIDLERs are recommended to perform perimeter surveys, with alpha instruments as the second choice. If FIDLERs are unavailable, and if weather or field conditions prevent the use of alpha instruments, the AN/PDR-56F or ADM-300, with the X-ray probe attached, may be used. If fission products were caused by the accident, priority should be given to establishing a 10 mR/hr perimeter.

AP6.2.3. Fixing Survey Points. For radiation monitoring data to be useful, the point where it is collected must be identifiable on a map or aerial photo of the area. Global positioning equipment may be unavailable to determine precise positions in the early phases of response, or the immediate need for radiological data may outweigh the time required to determine precise positions.

AP6.2.3.1. Data points should be marked in some manner so that the point may be later relocated for other actions, or the position determined precisely for later correlation of the data with other information.

AP6.2.3.2. A numbered or uniquely identified stake may be used to mark the location on soil, and a similar unique identification painted or otherwise marked on pavement or other hard surfaces for later reference. When engineering survey equipment is not being used, the monitoring log, or data collection record, should show the identification marking used at each point, and an estimated position to use immediately after data collection.

AP6.2.3.3. Estimated positions may be street addresses in urban areas, the estimated distance down a street or road from an identifiable intersection, compass bearings taken on two or more identified reference points, or any other reference that may be located on the maps being used. If a vehicle is used during the initial perimeter survey, the odometer mileage from an intersection or other known point may be adequate for identifying positions in sparsely populated areas.

AP6.2.4. Recording Survey Data. If an engineering survey is being performed concurrently with the radiological survey, recording procedures must ensure that positional data being recorded at the transit position and radiological data being recorded by the monitors may be correlated. Monitoring and survey teams' records should include the following information:

AP6.2.4.1. Team member names.

AP6.2.4.2. Type instrument and serial number.

AP6.2.4.3. Date and start and stop times of survey.

AP6.2.4.4. Data location mark (stake number or other marking) when used.

AP6.2.4.5. Estimated or surveyed position.

AP6.2.4.6. Instrument reading indicating if the reading is "Gross," meaning the background radiation reading has not been subtracted or "Net," meaning the background radiation reading has been subtracted from the instrument reading.

AP6.2.5. Perimeter Surveys

AP6.2.5.1. Initial Perimeter Survey. Rapid identification of the perimeter of the contaminated area is required to prevent undue alarm, to help identify affected people, and to establish controls to prevent the spread of contamination. The OSC and civil authorities need at least a rough plot of the perimeter as soon as possible on which to base their actions. The urgency of perimeter definition is directly related to the population in the area. Streets and roads usually provide rapid access to populated areas, although the location of rivers or other terrain features that may hinder access to parts of the potentially contaminated area must be considered when directing the perimeter survey. The contaminated area may be a mile or more wide and several miles long, therefore use of widely separated monitoring points and a vehicle to move between monitoring points should be considered when directing the initial perimeter survey. ARAC projections, if available, shall help determine the area and distance the perimeter survey teams may be required to cover, and perimeter survey procedures may be adjusted accordingly. If perimeter survey teams are equipped with a radio, a position report at the perimeter locations on each traverse shall provide an immediate location of the perimeter to the command center and allow team progress to be tracked. While not classified, transmission of radiation readings should be discouraged on unsecured nets. Results of the perimeter survey (measurement data, pattern sketch, etc.) should be sent to the ARAC, which may then be used to refine the source team and the disposition pattern.

AP6.2.5.2. Full Perimeter Survey. FIDLERs should be used when performing a full survey of the perimeter. This may not be possible until after the specialized teams arrive and may take weeks to complete. The procedure most likely to be used consists of monitoring in and out along the edge of the area with readings being taken about every 50 feet. If weather or terrain require the use of the AN/PDR-56 or ADM-300 X-ray probe on the initial perimeter survey, the full perimeter survey may result in an expansion of the perimeter. If an alpha

instrument was used for the initial perimeter survey, the perimeter established by the full perimeter survey should be about the same size or slightly smaller.

AP6.2.6. Area Surveys. Radiological surveys of the contaminated area are required to identify areas requiring the replication of fixatives, to support decontamination and remediation planning, and to determine decontamination effectiveness. The first survey covering the entire area is provided most times by the AMS. The initial AMS helicopter data shall be available four to five hours after completion of survey flights. Fixed wing survey results are usually available one hour after flight completion. The AMS plot requires interpretation by trained analysts. Ground survey data are required to confirm and support analysis of the plot. Some of the supporting ground data may be provided by the initial perimeter survey. Ground surveys to support decontamination planning shall be performed with FIDLERs. Usually some form of grid survey is used with the grid size determined by the desired accuracy of estimated activity between grid points and measurement errors associated with the instruments. Several days to over a week may be required to complete a ground survey of the entire area. Ground surveys confirming decontamination effectiveness may require several months to complete due to the low levels of contamination remaining and the desired precision.

AP6.2.7. Building Surveys

AP6.2.7.1. Radiological surveys of buildings within the contaminated area shall be required to determine the appropriate decontamination actions. Alpha instruments may be used on most building surfaces; however, use of FIDLERs may be necessary on surfaces that may damage alpha instruments, or on materials such as carpets, where contamination may be below the surface and screened from alpha instruments. The amount of removable contamination present must be determined by wiping surfaces with a piece of material, or swipe, which is then monitored for contamination it adsorbed. Laboratory counting equipment should be used to determine the amount of removable contamination absorbed by the swipe. Initial building surveys should be done only on the exterior unless the building is in use.

AP6.2.7.2. Civil authorities should establish procedures for either building owners and/or tenants, or an appropriate civil authority, such as a policeman, to accompany monitors when surveying building interiors. If interiors are surveyed before the surrounding area has been decontaminated, methods that reduce tracking of contamination into buildings should be used (for example, cover shoes with plastic bag immediately before entering buildings and ensure gloves are uncontaminated). Interior contamination levels shall vary because of the time of year, the type of heating or cooling system used, and whether people were in the building during, or following the accident. Interior contamination levels shall be only a fraction of the exterior levels at the same location. The primary source of interior contamination is expected to be airborne contaminants entering the building through heating or cooling systems, and doors, windows, or other openings during the initial cloud passage; or contamination tracked or carried into the building by people or animals. The sealing of doors, windows, chimneys, and ventilators on evacuated buildings in highly contaminated areas may reduce further contamination of the interior during decontamination of the surrounding area. When monitoring the interior of a building, initial monitoring should be on the floor in the main traffic pattern (doorways, halls, and stairs), and on top of horizontal surfaces near heating or cooling duct

outlets, windows, and other openings into the building. If no contamination is found at these locations it is very likely no contamination entered the building. If contamination is found, additional monitoring should be performed. Monitoring results from furnace and air-conditioning filters should be included in building survey records.

AP7. APPENDIX 7

ENVIRONMENTAL SAMPLING

AP7.1. GENERAL

Collecting and analyzing samples provides numerical data that describe a particular situation. The ASHG shall direct sampling procedures. The sampling criteria shall be situation and site dependent. The results then may be used for preparing a course of action. This appendix addresses air, soil, vegetation, water, and swipe samples.

AP7.1.1. Air Sampling. Air sampling is conducted to determine if airborne contamination is present. It provides a basis for estimating the radiation dose that people without respiratory protection may have received. The time required to respond to an accident and initiate an air sampling program usually results in little or no data being obtained during the initial release of contamination when the highest levels of airborne contamination are expected. Most air sampling data obtained during an accident response shall reflect airborne contamination caused by resuspension. Even though this discussion is directed mainly at airborne contamination caused by resuspension, the recommended priorities and procedures shall allow as much information as possible to be collected on the initial release if air samplers are positioned soon enough. Priority should, therefore, be given to initiating an air sampling program as soon as possible after arrival on scene. Whether or not data are obtained on the initial release, air sampling data are needed immediately to assess the hazard to people still in the area, to identify areas and operations that require respiratory protection, and to identify actions required to fix the contaminant to reduce the airborne hazard and spread of contamination. When using filtration to collect particulate samples, the selection of filter medium is extremely important. The filter used must have a high collection efficiency for particle sizes that deposit readily in the lung (5 microns or less).

AP7.1.2. Response plans should include provisions for establishing an air sampling program. This plan should include sufficient air monitors (battery powered or a sufficient number of portable electric generators), air monitor stands, filter paper, personnel to deploy samplers and collect filters, analysis capability, and a method to mark and secure the area monitors against tampering. Also important is a means to ensure that air samplers are properly calibrated (see table AP7.T1.). Staplex® air samplers use the High Volume Calibration Kit (CKHV) calibrator for a 4-inch filter and CKHV-810 calibrator for the 8 x 10-inch filters. Usually, 1,000 cubic feet per minute (CFM) of air must be sampled for accurate results.

Table AP7.T1. Air Sampler Calibration

Filter Type	Calibration Kit	Flow Rate	Operation Time
4" TFA #41	CKHV	18 CFM	55 min
4" TFA #2133	CKHV	36 CFM	28 min
4" TFA “S”	CKHV	70 CFM	15 min
8" x 10" TFA-810	CKHV-810	50 CFM	20 min

AP7.2. AIR SAMPLING TIME

The period of time over which an air sample is collected and the volumetric sampling rate determine the volume of air sampled. Variables that affect the accuracy of air sampling results include the type of sampling equipment used, the accuracy with which contaminants on the filter may be measured, and the size of the sample. The sum of the errors may be offset, in part, by increasing the total volume of the sample collected. Increasing sample time presents no real difficulty when the interest is in long-term average concentrations, precision of results, or in detecting very low levels of contamination, as is the case during decontamination and remediation operations. During the initial response, when the interest is in rapid evaluation of air contamination to identify areas where high concentrations of airborne contamination might pose a hazard to unprotected persons in relatively short periods of time, short sampling times are appropriate. When taking samples for rapid evaluation, samplers should be operated long enough to sample at least 1,000 cubic feet of air. Once the data required for prompt evaluation are obtained, an air sampling program should be established to obtain 24-hour samples (equipment allowing), or high volume samples on a regular basis.

AP7.3. AIR SAMPLER PLACEMENT

Sampler positioning is directed toward the accident scene for the first 24 to 48 hours after an accident, or until an air sampling program tailored to the specific situation may be implemented. During this period, the number of air samplers available shall be limited and should be placed to get the maximum amount of information possible.

AP7.3.1. The amount of airborne contamination caused by resuspension varies from location to location as a function of surface type, physical activity, surface wind patterns, and the level of contamination on the ground. Recommendations on the initial placement of samplers assume that the mix of surface types is relatively constant throughout the area, that air samplers are placed to reduce any localized wind effects, and that the location of physical activity in the area (for example, response actions or evacuation) is known and controlled. The main variables in determining the amount of airborne contamination are ground contamination levels and wind speed. To provide the quickest and most accurate estimate of the maximum concentrations of airborne contamination, priority should be given to placing an air sampler at or near the most highly contaminated area that is accessible.

AP7.3.2. Figure AP7.F1., below, shows the recommended placement of air samplers. The sampler number indicates the priority that should be given to placement. All air sampling locations should be marked with a unique number or symbol on a stake so that data may be correlated with other information in the following days. During the initial response, sampler No. 1 is placed downwind from the accident site to determine the hazard in the immediate area of the accident and should operate continuously. The distance should be modified in a downwind direction, if necessary, to allow access by a clear path for placement and periodic readings and filter changes. The time of readings and/or filter changes should be coordinated with EOD

personnel. Sampler No. 2 is placed downwind from the accident at a distance dependent on the wind velocity (see table AP7.T2., below). Changes to this location should be considered based on accessibility, the location of nearby populated areas, and microclimatology. Downwind samplers should be operated until it is found that no airborne contamination exists at their locations and that actions taken upwind of the location or changes in meteorological conditions do not result in airborne contamination. Sampler No. 3 is placed about 610 m upwind of all contamination and outside the CCA to get simultaneous background air samples for use in interpreting other readings. Background samples should be collected concurrently with the sample of interest, if possible, since the amount of naturally occurring airborne radioactive particulates may vary as a function of time due to wind changes. Air sampler No. 4 is placed at the CCS and operated continuously during CCS operations, since personnel leaving the contaminated area may carry and resuspend contaminants. The amount of contamination resuspended in this manner is expected to be small. During the initial phases of response, consider using all additional samplers, if available, in downwind locations to supplement sampler No. 2, particularly when populated areas are in or near the contaminated area.

Figure AP7.F1. Air Sampler Placement

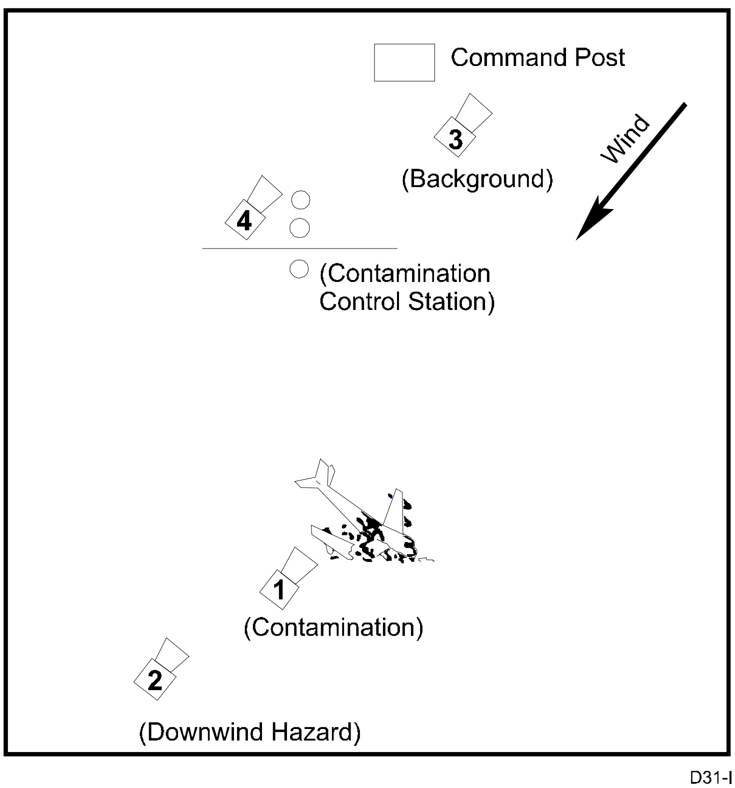


Table AP7.T2. Air Sampler Placement (No. 2) Distance

Wind Speed		**Approximate Downwind Distance**	
Miles Per Hour (MPH)	**(Knots)**	**(Meters)**	**(Feet)**
6 to 10	4 to 9	1,000	3,300
11 to 15	10 to 13	1,500	5,100
16 to 20	14 to 17	2,000	6,600
Above 20	Above 17	2,500	8,200

AP7.4. AIR SAMPLE DATA RECORDING

For air sampling data used in the overall radiological assessment and confirmation of field computations and confirmed later by laboratory analysis, all pertinent data must be recorded. An air sampling log containing all of the data in paragraphs AP7.4.1. through AP7.4.9. should be maintained. When filters are changed, they should be placed in a plastic bag for laboratory analysis and annotated with the following information:

AP7.4.1. Type and serial number of sampler.

AP7.4.2. Location of sampler, including identification of field marking (stake) used to mark location.

AP7.4.3. Average flow rate and/or volume of air.

AP7.4.4. Date.

AP7.4.5. Start and stop time of sample.

AP7.4.6. Wind direction and weather conditions.

AP7.4.7. Type of filter.

AP7.4.8. Field readings on filter and time made, particularly if readings were taken without changing filter, including radiation detection instrument type and serial number as well as designation of attached probe used to monitor the filter.

AP7.4.9. Laboratory facility to which the filter was sent for processing.

AP7.5. AIR SAMPLE ANALYSIS

Air sampler filters may be analyzed using radioanalytical techniques by DOE/NNSA and AFRAT personnel, or by using a computation method. The computations shown in paragraphs AP7.5.1. and AP7.5.2. are for field use in computing gross activity on the filter. Any background radiation from naturally occurring radionuclides (i.e., radon, thoron, and their daughters) should be subtracted when applying the computed results to protection standards. This is computed by subtracting the gross activity of the background sampler (No. 3) from the gross activity of the sampler of interest when making rapid evaluations. Background corrected results may also be obtained by letting the naturally occurring radon, thoron, and their daughters decay to background. The radon chain may be considered completely decayed after almost four hours, and the thoron chain after almost three days. Remeasurement after these times allows identification of the amount of sample activity caused by these elements. During rapid field computations early in the response, the check for radon is appropriate if, or when, levels of airborne contamination detected are at or slightly above the established levels. The three-day decay time prevents checking for thoron during the initial response.

AP7.5.1. The equation in figure AP7.F2., below, may be used for initial field evaluation of air sampling data to get rough estimates of airborne contamination using the ADM-300, AN/PDR-77, or AN/PDR-56 (with the large probe attached) and 8 x 10-inch or 4-inch (round) Whatman #41 filters. Results measured in dpm/m^3.

Figure AP7.F2. Equation for Initial Field Evaluation of Air Sampling Data

$$dpm/m^3 = \frac{\text{CPM x CF}}{\text{AFR x T (min)}} - \text{Background Reading}$$

where:

- CPM = Alpha meter reading on air filter in counts per minute
- CF = Conversion factor (3,000 for ADM-300; 4,000 for AN/PDR-56) includes unit conversions, area correction factors, and other constants, assuming use of 8 x 10-inch Whatman #41 filter paper. For 4-inch, (round) filter paper, the conversion factors are 200 and 800 for the AN/PDR-77 and AN/PDR-56, respectively.
- AFR = Average Flow Rate of the air sampler in CFM
- T = Time in minutes the air sampler was running

AP7.5.2. If other alpha instruments or filters are being used, the equation in figure AP7.F3., below, should be used for field evaluation of air sampling data. Results are measured in dpm/m^3.

Figure AP7.F3. Equation for Field Evaluation of Air Sampling Data

$$dpm/m^3 = \frac{\text{CPM x } A_f}{0.5 \text{ x } m^3 \text{ x F x } E_f \text{ x } E_c \text{ x } A_c}$$

where	CPM	=	Alpha meter reading on air filter in counts per minute
	A_f	=	Area of filter used (any units)
	m^3	=	Total volume of sampled air in cubic meters
	F	=	Alpha absorption factor for filter used (from manufacturer's specifications)
	E_f	=	Collection efficiency of filter used (from manufacturer's specifications)
	E_c	=	Efficiency of counting instrument
	A_c	=	Area of filter actually counted by the instrument (same units as A_f)

AP7.6. ENVIRONMENTAL SAMPLES

AP7.6.1. Soil. Soil sampling procedures depend on the purpose of the sampling program. In all cases, careful selection of control (background) samples is required to allow interpretation of results. The following minimum quantities are necessary for analysis:

AP7.6.1.1. Gamma spectrometry plus gross alpha and/or gross beta: 2 kilograms of soil (about 1 square-foot area 3 inches deep).

AP7.6.1.2. Gross alpha and/or gross beta only: 100 grams.

AP7.6.1.3. For a specific alpha and/or beta radionuclide, particularly Pu-239, consult the appropriate Service laboratory.

AP7.6.2. Water. The following minimum quantities are necessary for analysis:

AP7.6.2.1. Surface and/or waste discharge sources: 2 liters.

AP7.6.2.2. Drinking water sources: 1 liter.

AP7.6.3. Vegetation. The minimum sample volume is 3 liters of densely packed sample and should be double plastic bagged or packed in a 1-gallon widemouth plastic jar.

AP7.6.4. Swipes. Filter paper discs are used for taking swipe tests. Whatman #41 filter paper, 4.25 cm, Federal Stock Number 6640-00-836-6870, is recommended for swipes. If this is unavailable, other filter paper with a maximum diameter of l¾ inches may be substituted. Place a small "x" IN PENCIL ONLY on the outer edge of the filter paper on the side that is to touch the radioactive source or area being tested for contamination. Each swipe should be taken from an area of about 100 cm^2 by gently rubbing two or three times with the dry filter paper disc. The swipe is then placed, unfolded, in a properly completed Service form for a Swipe Container. If forms are unavailable, a plain envelope containing the required collection information may be substituted.

AP8. APPENDIX 8

BIOASSAY PROCEDURES

AP8.1. BIOASSAY

AP8.1.1. Bioassays are procedures that estimate the amount of radioactive material deposited in the body, either by direct measurement, using sensitive X-ray detectors placed over the chest (lung counting) and/or other organs, or by detecting radioactivity in excreta (feces and urine). Therefore, many factors must be known in addition to the quantity and isotopic distribution of the material to accurately estimate the dose. These factors include chemical form, route of intake, elapsed time from intake, organ(s) containing the material, distribution pattern, organ(s) mass(es), biological half-life, particle size of the original material, and decay scheme of the radioisotope. Complex mathematical models have been developed that take each of these factors into account.

AP8.1.2. Three methods are used to determine the amount of material present in the body. Each method has specific advantages and disadvantages and the specific methods used in any given situation shall be determined by the health physicists.

AP8.1.2.1. Fecal Sampling. Fecal sampling may be an effective means of detecting inhaled insoluble material that has been transported from the lungs to the gastrointestinal (GI) tract and excreted. Fecal samples may be quickly screened using low-energy gamma detectors such as the FIDLER to estimate the plutonium or americium content. For more definitive results, chemical separation and low-level counting techniques (which may take days or weeks) must be used. Fecal samples should not be collected until at least 48 hours after exposure to allow the contamination to pass through the GI tract. (Samples collected sooner than this may not be representative and may, in fact, give a false sense of security.) The optimal time for sampling is between two and three days after the inhalation; however, samples collected weeks or months after an intake may still be useful, depending on the size of the intake. Samples should be collected in well-sealed bags. Local medical supply houses or medical facilities should have collection kits (which fit onto a standard toilet seat) which may make sample collection easier. Figure AP8.F1., below, may be used to roughly estimate the committed effective dose equivalent (CEDE) from inhaling weapons grade plutonium based on contamination detected in a single fecal sample.

AP8.1.2.2. Urine Sampling. Urine sampling is a less sensitive indicator of plutonium exposure; only a tiny fraction of the amount inhaled is excreted through urine. This fraction also depends on the solubility of the plutonium in the original aerosol. Samples taken during the first five days after the exposure may not reflect the quantity of plutonium inhaled due to the time required for movement through the body. Large volume samples collected for 24 hours are preferred. Urine samples must be processed in a chemistry laboratory before quantification is possible, but screening for very high levels (by gamma-scanning for Am-241) may sometimes be done in the field. Samples should be submitted in plastic or glass bottles with well sealed tops. Figure AP8.F1., below, may be used to roughly estimate the CEDE from inhaling weapons grade

plutonium based on contamination detected in a single urine sample. Samples taken for several years after exposure may be used since plutonium is insoluble in the lung. Material is usually released from the lung into the bloodstream over a very long period of time. Some material may be so insoluble, it may not even show up in the urine for several years.

AP8.1.2.2.1. Single voiding urine samples should be collected from all personnel suspected of being exposed (through inhalation) to significant quantities of uranium. The optimal time for such samples is from 24 to 48 hours after exposure, although samples collected for days or weeks after an intake may be useful depending on the size of the intake. Such samples must be processed by a radiochemical laboratory. These analyses typically take several days to several weeks. Since uranium from normal environmental sources is always present in the urine, care must be taken to determine whether the level of uranium detected is significantly greater than this "background" level.

AP8.1.2.2.2. Single voiding urine samples should be collected from all personnel suspected of being exposed to significant quantities of tritium. Exposed workers should void their bladders immediately after exposure to avoid collection of a non-representative sample. Subsequent voids are collected for analysis. The optimal time for such samples is from four to eight hours after exposure, although samples collected for days or weeks after exposure may still be useful. Samples collected sooner than 90 minutes after exposure may not be representative. Usually such samples must be processed in a radiochemistry laboratory (using liquid scintillation counters) but portable liquid scintillation counters are available in some emergency response organizations. Urine sampling is the main way of determining tritium uptake.

AP8.1.2.3. Lung Counting. Lung counting is the direct measurement of emitted X-rays and gamma radiation (typically Am-241 in a weapons accident) from the body with a sensitive low energy photon detector. Lung counters are used at National Laboratories DOE Sites, commercially, and at some hospitals and universities. Most lung counters are immobile systems using large shielded rooms (special trailer mounted systems may be obtained through the DOE/NNSA in a few days), and the patient must be sent to the facility. Inhaled plutonium stays in the lungs for extended periods of time. Portable FIDLER (or similar) detectors may be used for rough screening measurements but have poor sensitivity. However, such measurements may be easily distorted by small amounts of surface contamination, and should only be performed by experienced and qualified personnel. Figure AP8.F1. may be used to roughly estimate the CEDE from inhaling weapons grade plutonium based on the results of a lung scan for Am-241. Note that a negative lung count measurement obtained with a FIDLER or other portable instrument does not rule out a significant intake of transuranics.

AP8.1.3. Interpretation of Single Bioassay Results: Weapons Grade Plutonium. Figure AP8.F1. may be used to make a rough initial estimate of the dose significance of a single bioassay measurement (Am-241 gamma scan) obtained after acute inhalation of weapons grade plutonium. The curves represent the 50-year CEDE implied by a 24-hour urine or fecal sample result of 1 microcurie of Am-241, or a lung count of 1 microcurie of Am-241, on a given day after inhalation. Note that these curves are using the Am-241 result from a gamma count as a "marker" for the entire mix of plutonium and americium found in weapons grade plutonium. Accordingly, these curves may not be used directly for plutonium results; they must be used with

Am-241 results. Note also that figure AP8.F1. may not be used to interpret uranium or tritium bioassay results.

AP8.1.3.1. The following steps are used:

AP8.1.3.1.1. Move right along the horizontal (X) axis to the number of days between inhalation and sample collection.

AP8.1.3.1.2. Move up to the curve of interest (urine sample, fecal sample, or lung count).

AP8.1.3.1.3. Move left to read the dose-per-microcurie on the vertical (Y) axis.

AP8.1.3.1.4. Multiply this dose-per-microcurie by the actual sample or measurement result.

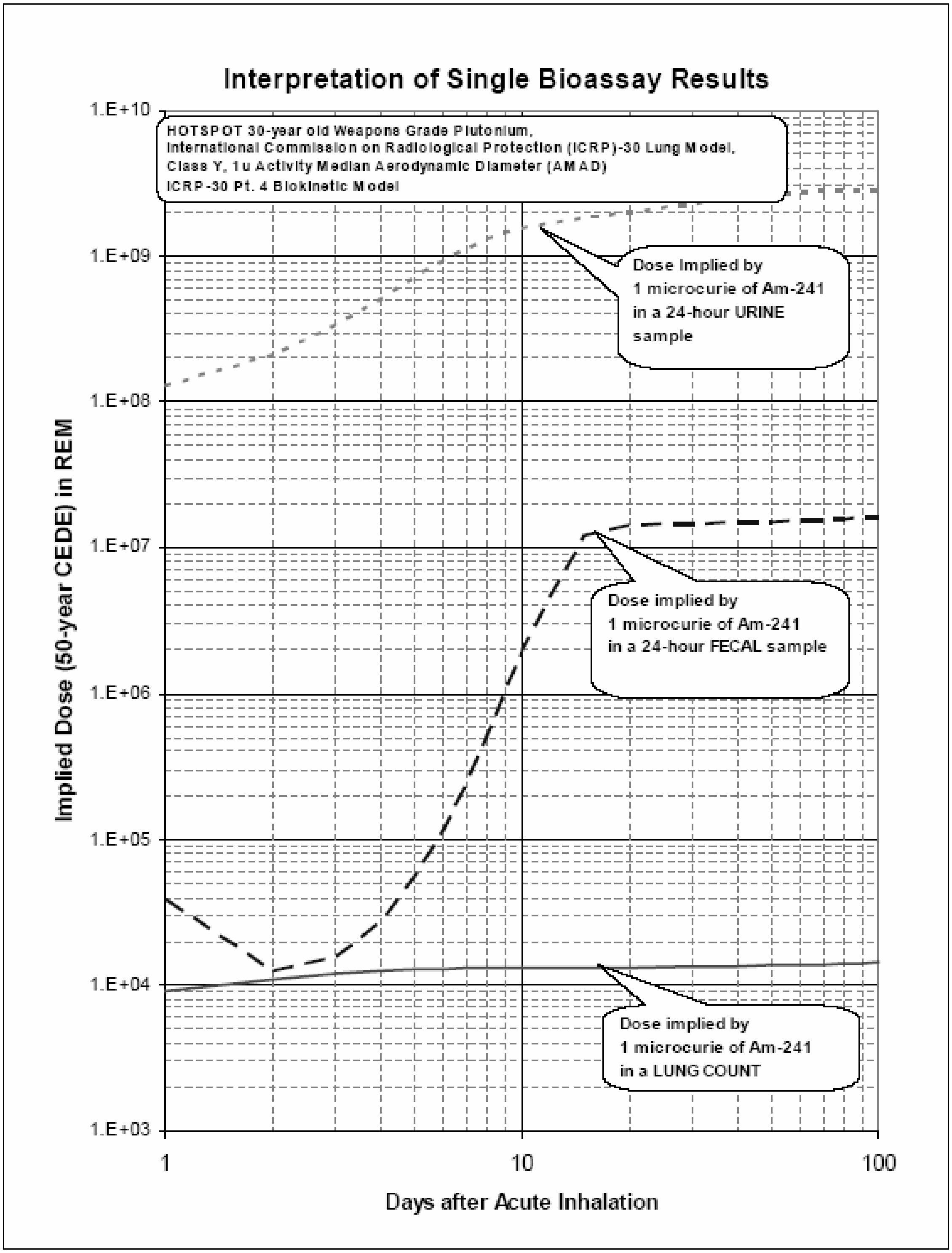
AP8.1.3.2. <u>Example of Use</u>

AP8.1.3.2.1. A fecal sample was collected about a week after a person was exposed to a fire involving weapons grade plutonium. The plutonium involved in the fire is known to be about 30 years old. A "screening" gamma scan was performed on this sample, giving a result of 5.0×10^{-5} μCi (about 110 dpm) of Am-241. What is the approximate dose implied by this single result?

AP8.1.3.2.2. The fecal sample dose-curve is represented by the heavy dashed line. At 7 days after inhalation, the dose-per-microcurie value is about 2×10^{5} REM. Multiplying this value by the actual fecal sample result of 5.0×10^{-5} μCi gives an implied 50-year CEDE of about 10 REM.

AP8.1.3.3. <u>Cautions about Use</u>. There are many potential sources of uncertainty and error in using a single bioassay measurement to estimate dose. Different exposure or intake scenarios, individual biological differences, and sample collection and analysis uncertainties all contribute to this overall uncertainty. Accordingly, such "single-point" dose estimates should be viewed as rough indicators, at best.

Figure AP8.F1. <u>Estimated 50-Year Committed Effective Dose</u>



AP8.1.3.4. Technical Notes for Figure AP8.F1.

AP8.1.3.4.1. These curves are generated by estimating the fraction of an inhaled intake that would be excreted through the urine or feces, or kept in the lungs, on any particular day after intake. Dividing the actual bioassay result by these "intake excretion fractions" or "intake retention fractions" gives an estimate of the initial intake. Multiplying this estimated intake value by a "dose conversion factor" (DCF) (dose per unit intake) gives an estimate of the dose.

AP8.1.3.4.2. The material inhaled is assumed to be a 30-year old mixture of "weapons grade" plutonium, as characterized by the LLNL "Hotspot" Health Physics Computer Programs. (The Am-241 concentration is about 4,300 parts per million.) The material is assumed to have "Class Y" (very insoluble) lung solubility characteristics and to have a particle size distribution of 1 micrometer AMAD. Since the Am-241 is assumed to have "grown-in" to the plutonium matrix, the Am-241 is assumed to have the same lung solubility characteristics as the plutonium. It is also assumed that this Am-241 shall have the same systemic retention and excretion characteristics as the "parent" plutonium. These assumptions are somewhat simplistic, but are likely to provide a conservative estimate of dose.

AP8.1.3.4.3. For consistency with current guidelines and regulations, the following models were used to generate the intake excretion and retention fractions used in figure AP8.F1.:

AP8.1.3.4.3.1. ICRP-30 Respiratory Tract Model.

AP8.1.3.4.3.2. ICRP-30 GI Tract Model.

AP8.1.3.4.3.3. "Jones" Plutonium Excretion Model.

AP8.1.3.4.4. The intake, excretion, and retention fractions were computed, but are essentially the same as those published in NUREG/CR-4884http://www.nrc.gov/reading-rm/doc-collections/reg-guides/occupational-health/active/8-09/ - book8#book8 (reference (bm)).

AP8.1.3.4.5. DCFs were taken directly from Federal Guidance Report 11 (reference bm)). This report uses the ICRP-30 Respiratory Tract and GI Tract Models, the ICRP-48 Systemic Model for Plutonium and Americium, and the tissue weighting factors of ICRP-26.

AP8.1.3.4.6. Newer Biokinetic Models. The ICRP has recently introduced a new Respiratory Tract Model (ICRP-66) and new biokinetic models for plutonium and americium (ICRP-67.) Use of those models, coupled with corresponding DCFs (ICRP-71) produces dose estimates that are usually from two to five times lower than those of figure AP8.F1. Thus, the curves of figure AP8.F1. probably provide a conservative estimate of doses from such an intake.

AP8.2. BIOASSAY PROCEDURES

AP8.2.1. The Federal Agency, State agency, or the affected country may administrate a bioassay program for affected civilians. The guidelines in table AP8.T1., below, are provided to assist the response force or civilian authorities conducting initial screening in advising individuals contaminated when requested to provide urine or fecal samples for analysis. Advisors explain that sample analysis determines if the individual received a detectable radiation dose when contaminated. The bioassay procedures used shall be established by health physicists responding to the accident. If possible, all follow-up bioassay monitoring or sampling protocols should be established by a health physicist who has specific experience and expertise in the internal dosimetry of plutonium and/or uranium. The DOE's ARG usually has such dosimetry assets available. When bioassay samples are collected, try to keep samples and their containers free of contamination from the environment, clothing, or skin. Since tritium contamination may not be detected by CCS monitoring, anyone suspected of having been exposed to tritium should follow the guidelines in table AP8.T1. A bioassay program is recommended for all individuals without respiratory protection who are found to be contaminated. This program shall determine if any dose was received, and assure those who did not receive a dose that their health was not affected. To provide similar assurance to all people in the contaminated area, bioassays may be appropriate even for people who were not found to be contaminated; moreover, some people never in contaminated areas may request tests to ensure they were not affected by the accident.

Table AP8.T1. Guidelines for Bioassay Sampling

Suspected Radioactive Material	Feces Optimum Sampling Time After Exposure	Urine Optimum Sampling Time After Exposure	Sample Quantity
Plutonium	2 to 3 days	2 to 3 weeks	24 hours total
Uranium	2 to 3 days	24 hours	24 hours total
Tritium	N/A	4 to 8 hours	1 voiding

AP8.2.1.1. Bioassay Priorities. If a nuclear weapon accident occurs near a populated area, getting bioassay samples from large numbers of people may be necessary. Accurate identification of all bioassay samples (full name, ID and/or Social Security number, age, gender, address, phone number, and date and time of collection) is imperative. The specific reason for sampling (e.g., "facial contamination: 50,000 CPM alpha" or "1 mile downwind during initial plume passage" should also be included to aid in later prioritization of processing. Considering the potential for public concern for their possible exposures, it may probably be better to err on the side of collecting too many samples, rather than too few samples. Note that samples may be collected from large numbers of people during the optimal collection time period, and then stored for later analysis on a prioritized basis. Fecal samples should be frozen, and urine samples should be refrigerated (not frozen.)

AP8.2.1.1.1. Since it is very difficult for a significant amount of plutonium to be incorporated into the body without gross contamination of skin or clothing also occurring, initial alpha monitoring that identifies contaminated personnel may also provide a method for assuring

that those with the greatest possibility of radiation exposures (that may affect their health) are given priority treatment.

AP8.2.1.1.2. Table AP8.T2., applicable only to people not wearing respiratory protection, provides recommended guidelines for assigning priorities for bioassay analysis. Response force personnel shall usually be equipped with protective clothing and respirators, when required. Bioassays for response force personnel shall be performed in accordance with Service regulations and as directed by the OSC.

Table AP8.T2. Guidelines for Assigning Priorities for Collecting and Processing Bioassays

Alpha Contamination Level on Clothing or Skin

Priority	**60 cm^2**	**17 cm^2 probe**
HIGH	Above 300,000 CPM	Above 75,000 CPM
MEDIUM	50,000-300,000 CPM	12,500-75,000 CPM
LOW	Below 50,000 CPM	Below 12,500 CPM

AP8.2.1.1.3. Personnel falling in the HIGH priority category in table AP8.T2., above, may have had a substantial plutonium intake. Conversely, exposure to airborne contamination that produces a surface contamination level in the LOW category shall be less likely to result in a significant deposition in the lungs. To ensure alpha meter readings provide a valid guide for assigning priorities, individuals should be asked, during screening, if they have bathed or changed clothes since the time of possible contamination. The results of both alpha meter screening and bioassays for all personnel screened must be recorded and kept for future reference. Use of the Radiation Health History and Bioassay Screening Forms should be considered.

AP8.2.1.2. Nasal Smears. Contamination on a wipe (e.g., a cotton swab) from inside the nasal passage is a possible indicator of plutonium inhalation. If initial alpha meter screening indicates probable plutonium or uranium inhalation, a nasal smear shall be collected for analysis by specialized teams when they arrive on-site. However, due to the biological half-life of nasal mucus, a nasal smear is a reliable indicator only if collected during the first hour after the exposure. Accordingly, prompt nasal samples may be collected by any personnel, as long as they are taken carefully and labeled appropriately. Great care must be taken to avoid cross-contamination from the face, hands, or other sources while collecting nasal smear samples. Ideally, separate swabs should be taken from each nostril. Each of these should be bagged separately, then placed in another bag labeled with name, ID number (as applicable), and collection date and time. After collection, the swabs must not be placed into any gels or liquids since this would prohibit alpha particle counting. A negative nasal smear does not rule out an intake of radioactive material. Nasal smears are only one tool of many used to determine whether an intake has occurred.

AP8.2.2. Personnel Exposure and Bioassay Records. Documentation should be maintained on all personnel who enter the RCA, or who may have been contaminated before an RCA was established. Examples of forms used for recording data on personnel working in the RCA, or

who may have been exposed to contamination downwind from the accident, are in Appendix 12. To ensure appropriate follow-up actions are completed on all exposed, or potentially exposed people, a copy of all CCS logs, other processing station records, bioassay data, and other documentation identifying people who were or were not contaminated should be provided to the ASHG for consolidation into a single data file. This data file is subject to Privacy Act Regulations (section 552a of reference (bd)), and must be kept as part of the permanent accident records; therefore, procedures for handling data obtained on non-DoD personnel should be coordinated with the OSC's legal officer. Data obtained on DoD personnel shall be needed to satisfy Service-specific requirements in AR 11-9, BUMED P-5055, and AFI 48-125 (references (bo) through (bq)). These records shall be kept and become part of the individual's permanent medical record.

AP9. APPENDIX 9

SPECIALIZED RADIOLOGICAL MONITORING AND HAZARD ASSESSMENT CAPABILITIES

AP9.1. GENERAL

AP9.1.1. This appendix provides information on service radiation monitoring teams (health physics, bioassay specialists, and a radiation equipment repair team) and on the DOE/NNSA and related monitoring and assessment capabilities.

AP9.1.2. The methods of detecting and/or measuring of different types of radiation and their inherent difficulties have been listed; however, in the event of an accident, radiation must be detected and/or measured. The need of preliminary data on the absence and/or presence of radiation for the OSC is imperative. Many military units and some civilian firms and/or agencies have alpha and gamma detection capabilities. These units and/or firms have equipment and individual monitoring capabilities that may provide radiation measurements and preliminary survey data; however, a finite definition of the accident area is needed to plan, initiate, and complete SR.

AP9.1.3. The radiological characterization of the accident site is an iterative process involving the systematic integration of data produced by several assessment techniques. Section AP9.2., below, describes those resources available to enable theoretical, preliminary, and definitive site characterization for the OSC.

AP9.2. THE DEPARTMENT OF DEFENSE

AP9.2.1. DTRA HPAC. The HPAC is a forward deployable and/or reachback modeling capability available for Government, Government-related, or academic use. This software tool assists in emergency response to hazardous agent releases. Its fast running, physics-based algorithms enable users to model and predict hazard areas and human collateral effects in minutes. The HPAC provides the capability to accurately predict the effects of HAZMAT releases into the atmosphere and their impact on civilian and military populations. Subparagraphs AP9.2.1.1. through AP9.2.1.5. provide information on the HPAC modeling prediction shown in figures AP9.F1. and AP9.F2.

AP9.2.1.1. The HPAC software uses integrated source terms, high-resolution weather forecasts, and particulate transport to model hazard areas produced by accidents. One of the HPAC's strengths is fast access to real-time weather data through Meteorological Data Servers (MDS). The HPAC also has embedded climatology or historical weather for use when real weather is not available.

Figure AP9.F1. <u>HPAC Modeling Prediction: Surface Dose</u>

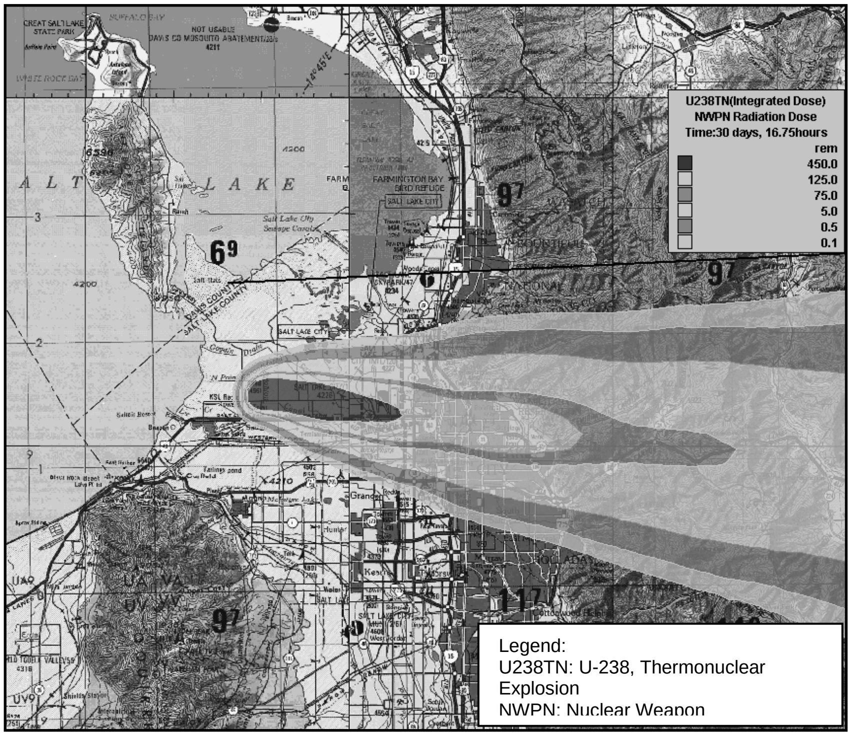
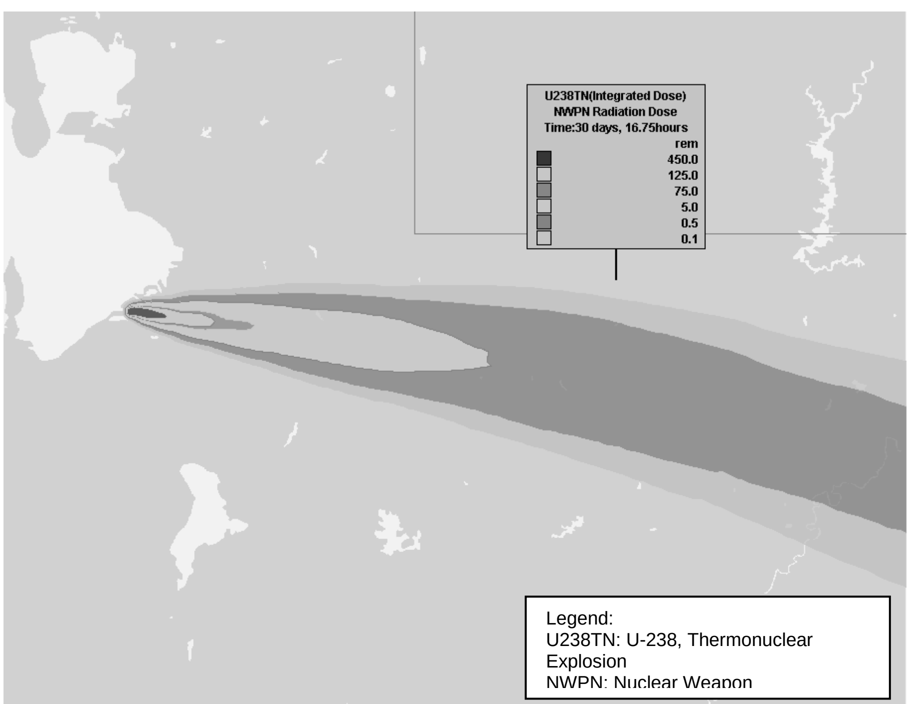


Figure AP9.F2. <u>HPAC Modeling Prediction: Hazards Area Effects</u>

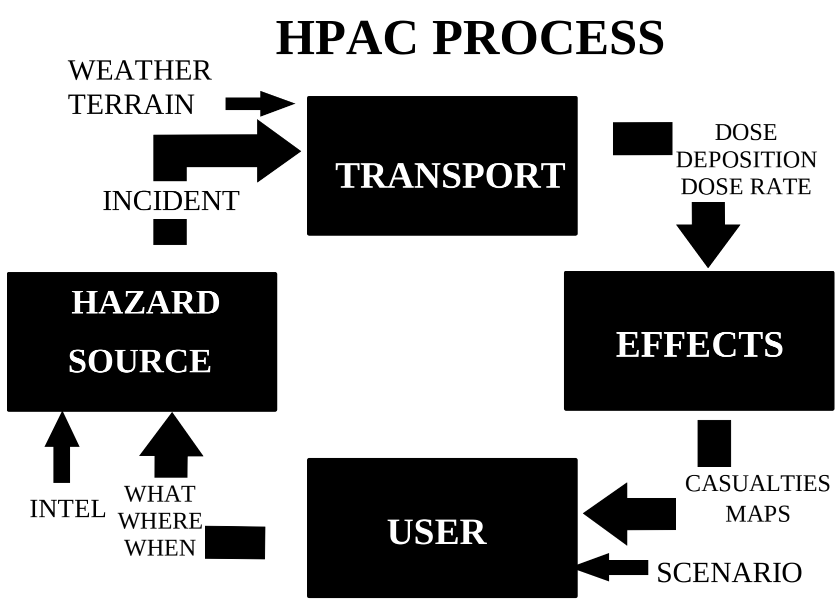


AP9.2.1.2. The HPAC models nuclear collateral effects of concern that may result from military or industrial accidents. The HPAC provides source information on potential radioactive releases from nuclear weapons or reactor accidents.

AP9.2.1.3. The HPAC includes the SCIPUFF model for turbulent transport, a new and advanced technology that provides a highly efficient and accurate prediction for a wide range of hazard scenarios. The HPAC may also help answer the question, "How good is the prediction?" by providing probabilistic solutions to the atmospheric transport problem. The HPAC builds source terms for hazardous releases for input to the atmospheric transport model, SCIPUFF. The current code hosts operator-friendly "incident" setup capability. Sample HPAC projects are provided that may be edited to suit a wide range of user requirements or accidents. Additional improvements in the software are planned, but user feedback shall ensure that these improvements include a user's perspective, not just a scientist's.

AP9.2.1.4. The HPAC Process. The overall process starts first with the need to assess a hazard, then the statement of the problem in detail, followed by the definition of the hazardous event or source in the HPAC. Meteorological data must be available. Then the SCIPUFF code transports the hazardous cloud (or "puffs") in the turbulent atmosphere. Effects of the HAZMAT at geographical locations are computed, and the results are provided to the user on a map or as a cross-section of the atmosphere. The overall process is summarized in figure AP9.F3., below. The wide arrows indicate the major steps in the HPAC process. The narrow arrows indicate critical inputs to the process. The weather, terrain, and hazard particle size mainly determine where a HAZMAT goes. The accuracy of the effects of the hazard depends on such details, as well as the detailed knowledge of the hazard itself.

Figure AP9.F3. HPAC Process



AP9.2.1.5. Weather and Terrain. Weather is a key ingredient to the HPAC process. Although the SCIPUFF is an accurate and efficient transport model, the results of a hazardous release are first and foremost affected by weather and how well the meteorology is defined. There are two types of inputs: observations and gridded numerical model data. Meteorological data are time sensitive. To keep the level of understanding required to use the HPAC and logistics to a minimum, the simpler meteorological inputs to the SCIPUFF (surface and upper air observations) are presented here. More advanced and accurate capabilities, such as very high resolution mesoscale weather models, are available on the DTRA's MDS.

AP9.2.1.5.1. In general, meteorological observations are very representative of the real world at the time and location where the data are taken. Assuming the weather does not change, reasonable results may be obtained for a period of two to four hours after the surface observations are taken. Upper air observations may be representative of a somewhat longer period of time. Observations at more locations, over a longer time period, are needed to accurately assess longer duration, longer range, and more lethal releases.

AP9.2.1.5.2. Forecasts and/or updated observations are needed for longer duration releases, but gridded forecast data are sometimes difficult to get and often are not accurate for transport applications. A single set of meteorological observations becomes less representative with distance from the observation site, with time from which the data are taken, around complex terrain, near sunrise and sunset, near weather fronts, near urban areas, and near land and/or water interfaces.

AP9.2.1.5.3. Fast access to weather data for HPAC users became highly advanced with the introduction of the DTRA MDS. Getting weather data is as easy as a click on a mouse with the HPAC's weather request generator, which provides access to forecast model and observation data in minutes.

AP9.2.1.5.4. Terrain may have a large effect on where a HAZMAT is transported. In addition to working with a variety of weather data types, the HPAC works with two types of terrain data. By default, the HPAC assumes a flat earth for the terrain, and this may be a reasonable approximation for small spatial domains; however, users may choose to use complex, 3-D terrain data describing the topographic variations. When the complex terrain option is used, it automatically invokes a mass consistent wind and turbulence model that is embedded within the HPAC. The digital terrain data files in the HPAC were developed using Digital Terrain Elevation Data Level 0, a product of the National Imagery and Mapping Agency. HPAC terrain models include an urban setting to closely approximate the effects of high-rise buildings.

AP9.2.2. AFIOH. The AFIOH, Brooks AFB, TX, provides the following radiation protection services:

AP9.2.2.1. Conducts calibration, traceable to the National Institute of Standards and Technology, and minor repair services for portable instruments used and owned by the USAF Medical Service for detecting and measuring electromagnetic and ionizing radiation.

AP9.2.2.2. Maintains the USAF stock of low energy photon field survey instruments with trained operators to support disaster operations.

AP9.2.2.3. Deploys a field-qualified team of health physicists, health physics technicians, and equipment called the AFRAT. This team is capable of responding worldwide to radiation accidents with air transportable equipment for detecting, identifying, and quantifying any type of radiation hazard; radioisotope analysis of selected environmental, biological, and manufactured materials; and on-site equipment maintenance and calibration.

AP9.2.2.4. Conducts special projects dealing with long- and short-term evaluations of radiation exposures.

AP9.2.2.5. Requests for additional information should be directed to AFIOH personnel. AFIOH services may be requested through the USAF Operations Center or the JNACC.

AP9.3. THE DOE

Services of the DOE/NNSA capabilities shall be requested by the DOE SEO.

AP9.3.1. Hotspot Health Physics Codes

AP9.3.1.1. The LLNL developed the Hotspot Health Physics Codes for the DOE ARG to provide emergency response personnel and emergency planners with a fast, field-portable set of software tools for evaluating accidents involving radioactive material. The software is also used for safety-analysis of facilities handling nuclear material.

AP9.3.1.2. Hotspot codes are a first-order approximation of the radiation effects associated with the atmospheric release of radioactive materials. The Hotspot atmospheric dispersion models are designed to determine close-in effects for short-term releases (up to a few hours) during steady wind conditions over flat terrain. Users requiring more detailed consequence assessments for complex or large releases, or for releases over longer times, such as during conditions with spatial and temporal varying meteorology, or for flows affected by terrain effects, etc., are directed to more sophisticated modeling capabilities as the DOE's NARAC. The Hotspot codes have been completely revised to take advantage of the Windows™ 95/98/00/XP/NT operating system environment.

AP9.3.1.3. Four general programs, Plume, Explosion, Fire, and Resuspension, estimate the downwind radiological impact after the release of radioactive material resulting from a continuous or puff release, explosive release, fuel fire, or an area contamination event. Additional programs deal specifically with the release of plutonium, uranium, and tritium to hasten an initial assessment of accidents involving nuclear weapons.

AP9.3.1.4. The FIDLER program is a tool for calibrating radiation survey instruments for ground-survey measurements and initial screening of personnel for possible plutonium uptake in the lung.

AP9.3.1.5. The Nuclear Explosion program estimates the effects of a surface-burst nuclear weapon. These include prompt effects (neutron and gamma, blast, and thermal), and fallout information. Fallout includes arrival time, dose rate at arrival time, and integrated dose contours for several time periods e.g., first six hours, first day, first week, etc.

AP9.3.1.6. Hotspot is a hybrid of the well-established Gaussian plume model, widely used for initial emergency assessment or safety-analysis planning. Virtual source terms are used to model the initial atmospheric distribution of source material after an explosion, fire, resuspension, or user-input geometry.

AP9.3.1.7. Hotspot incorporates both reference (bn) and the Federal Guidance Report No.13 (reference (br)) DCFs for inhalation, submersion, and ground shine. In addition to the inhalation 50-year CEDE DCFs, acute (24-hour) DCFs are available for estimating non-stochastic effects. This acute mode may be used to estimate the immediate radiological impact associated with high acute radiation doses (applicable target organs are the lung, small intestine wall, and red bone marrow). Individual target organ doses are optionally output by Hotspot. Hotspot supports both classic units (REM, RAD, Ci) and International System units (Sv, Gy, Bq). Users may add radionuclides and custom mixtures (up to 50 radionuclides per mixture).

AP9.3.1.8. Tables and graphical output may be directed to the computer screen, printer, or a disk file. The graphical output consists of dose and ground contamination as a function of plume centerline downwind distance (see figure AP9.F4.), and radiation dose and ground contamination contours (see figure AP9.F5.). Users have the option of displaying scenario text on the plots.

Figure AP9.F4. Hotspot Downwind Plume Centerline (Stability A-F)

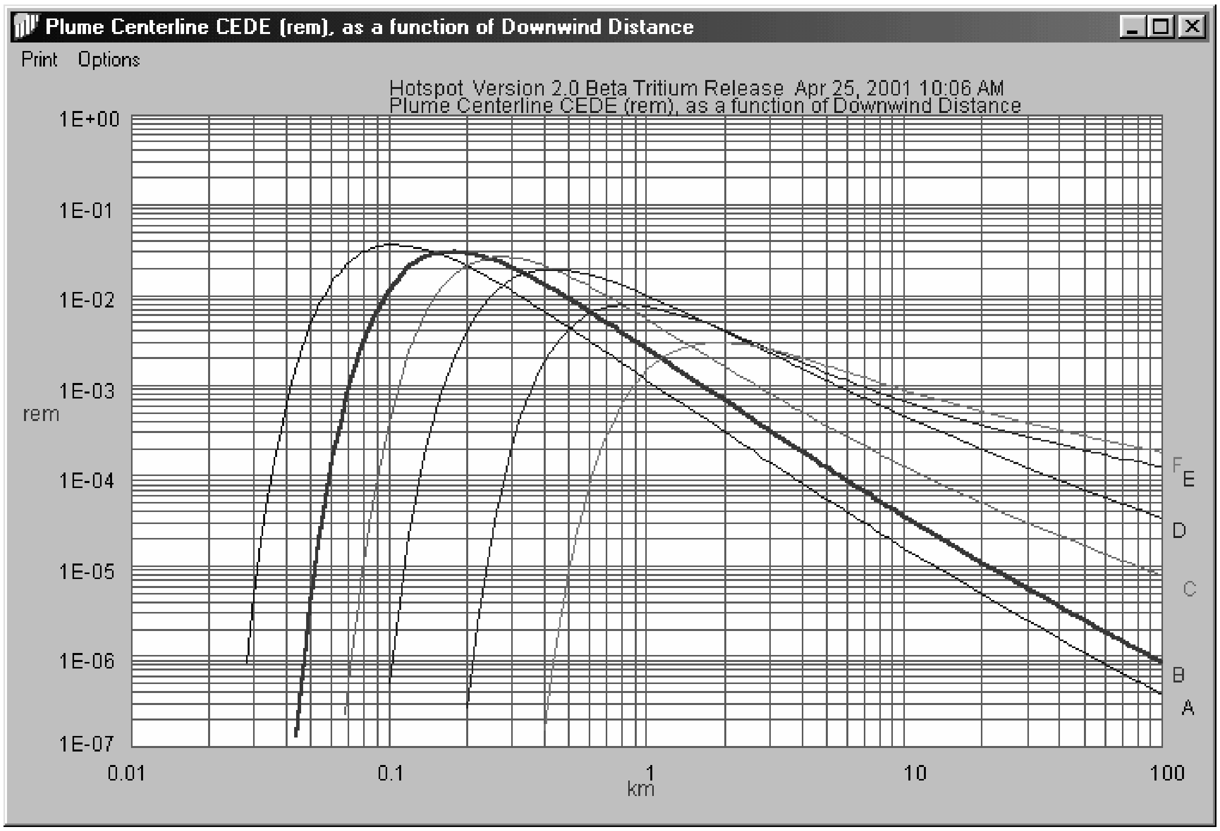
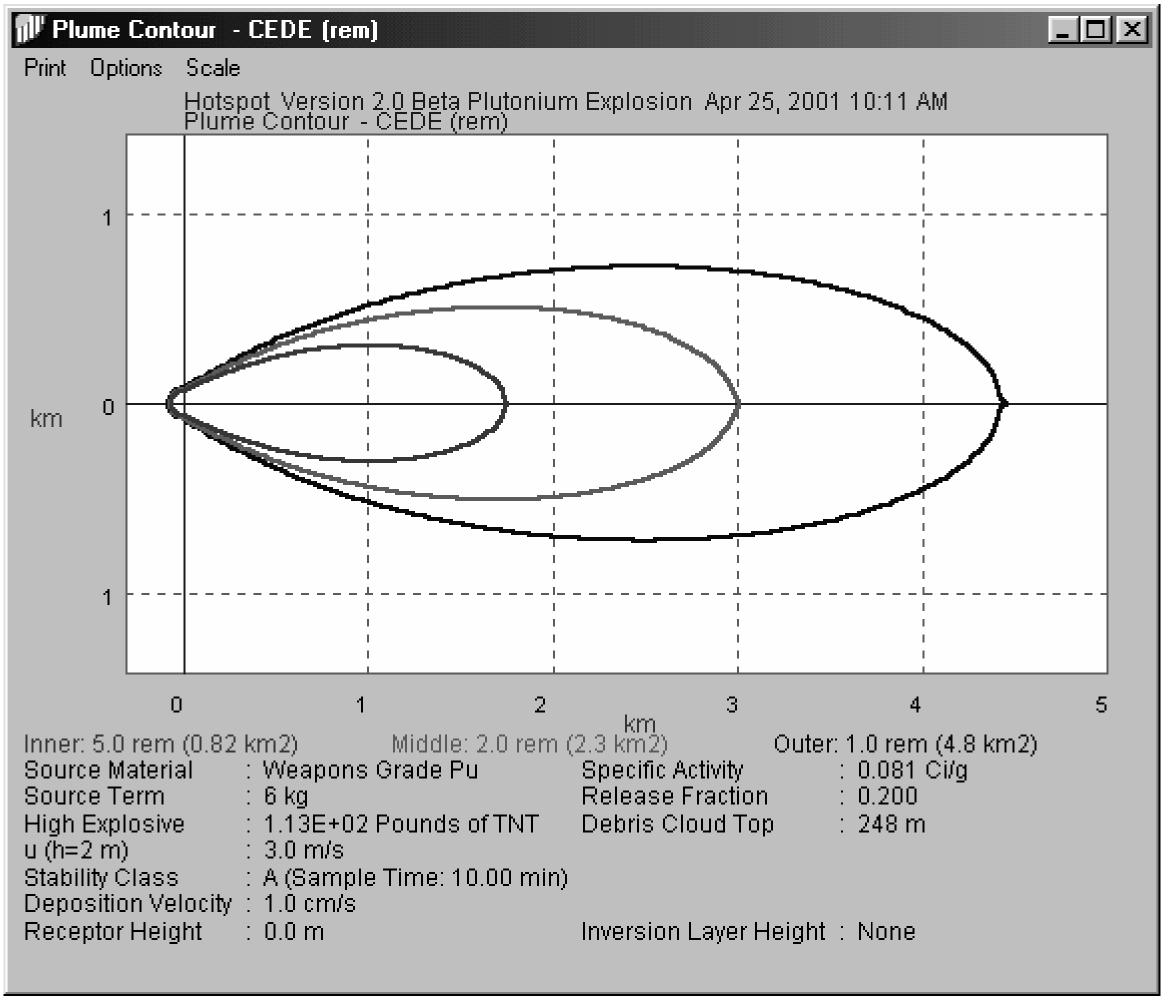
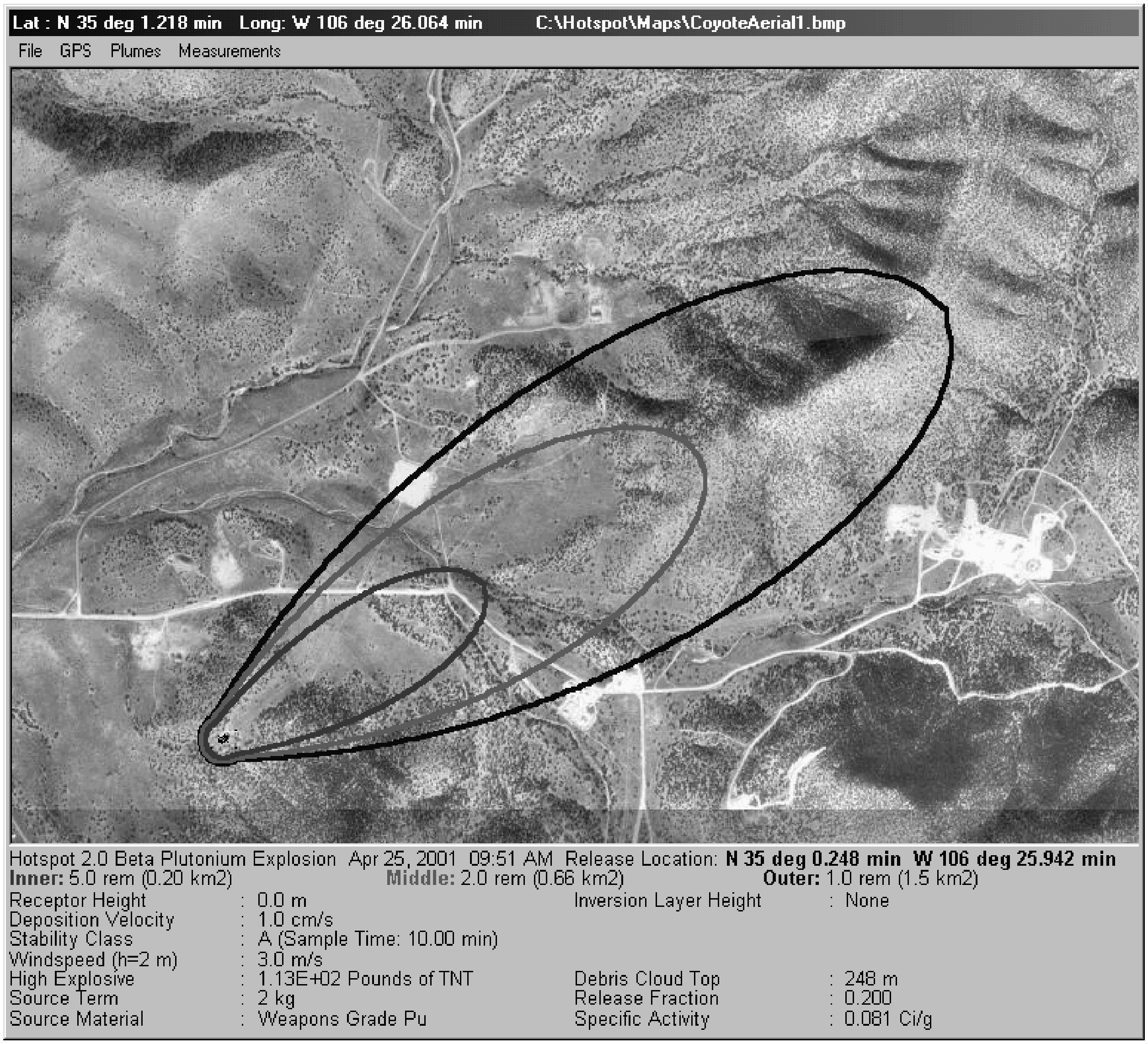


Figure AP9.F5. Hotspot Plume Contour Plot



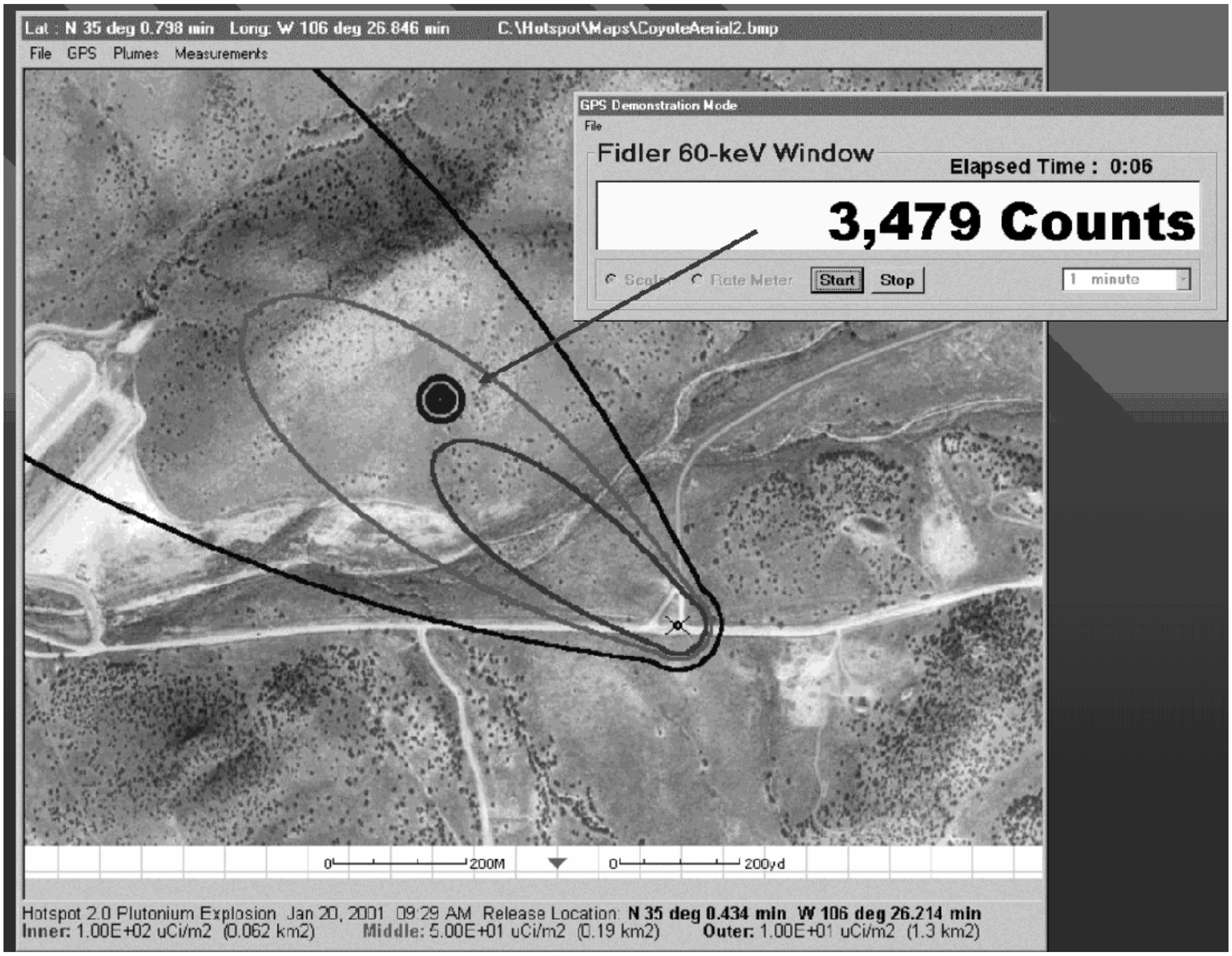
AP9.3.1.9. Radiation dose and ground contamination contours may also be saved as mapping files for display on geographical maps. Latitude and Longitude, Universal Transverse Mercator, and Military Grid Reference System geographical coordinate systems are supported for interfacing Hotspot dispersion contours with commercial mapping systems. Dose and Deposition plume contours may also be overlaid on geographical maps. (See figure AP9.F6.)

Figure AP9.F6. Hotspot Plume Contours Displayed on Aerial Photograph



AP9.3.1.10. Image files (bitmap format) may easily be georegistered and added to a user's map library. GPS units may be used to generate real-time instrument response for exercise support. Users may add additional instruments as desired. Hotspot has an on-board selection of plutonium-detecting instruments (FIDLER, Violinist, alpha probes, etc.) that may interact with the GPS unit and/or map. Users may select an instrument and emulate the instrument's response to the current atmospheric concentration and ground contamination. The current GPS location (Latitude, Longitude, Altitude) or mouse location is used for determining the applicable output values. (See figure AP9.F7.)

Figure AP9.F7. Virtual FIDLER Detector for Exercise Support



AP9.3.1.11. Hotspot strictly follows the well-established Gaussian model, and does not use any "black-box" techniques. All algorithms are presented and referenced in the onboard documentation.

AP9.3.2. ARAC. The ARAC is a DOE/NNSA and DoD resource, directed by the LLNL, that supports emergency response teams during accidents involving radioactive materials.

AP9.3.2.1. The ARAC provides the user with computer model estimates of the contamination distribution resulting from a nuclear weapon accident. ARAC products include computer-generated estimates of the location and contamination levels of deposited radiological material and radiation dosage to the exposed population in the surrounding areas. Until time and equipment allow completion of extensive radiation surveys and bioassays, ARAC projections shall help assess the potential impact of an accident and identify areas for initial investigation by response force radiological teams.

AP9.3.2.2. In the event of a nuclear weapon accident, at or near an ARAC serviced facility, the ARAC Center shall be alerted by the facility's personnel using the ARAC site system computer located at the installation, immediately after the initial report to the NMCC is

completed. If the accident occurred in a CONUS area, remote from an ARAC serviced DoD installation, the NMCC's JNAIRT shall notify the ARAC; however, the ARAC may be contacted directly by the installation initiating the OPREP-3 by calling the ARAC's emergency number: commercial (925) 422-9100.

AP9.3.2.3. During normal working hours (currently 0730 to 1615 Pacific Time), initial estimates of the extent of contamination may be ready for transmission from the ARAC about 30 minutes after the ARAC has been notified of the:

AP9.3.2.3.1. Accident location.

AP9.3.2.3.2. Time of accident.

AP9.3.2.3.3. Type and quantity of weapons involved in the accident.

AP9.3.2.4. Responses outside the hours listed above are subject to an additional 60- to 90-minute delay.

AP9.3.2.5. Every effort should be made to provide updated or supplementary information to the ARAC Center as soon as it is available. Desired information includes:

AP9.3.2.5.1. Observed wind speed and wind direction during the accident and later weather changes.

AP9.3.2.5.2. Description of accident particulars, including line numbers for the specific weapon(s) releasing contamination, type and amount of fuel involved (the ARAC has typical values for DoD aircraft and other transport vehicles), and measured contamination at specific locations with respect to the contamination source, if available.

AP9.3.2.5.3. Specific details of accident fire or explosion, such as mechanism of the release (HE detonation or fire), duration of any fire, and height and size of the plume or cloud (if available from reliable observers).

AP9.3.2.6. About 30 minutes after the ARAC facility has been notified of the necessary accident information, a computer-generated estimate of maximum credible ground-level contamination spread and projected whole-body effective dose to exposed persons in the downwind area shall be available. Conservative assumptions are made in computing the amount of radiological material released so that these initial projections place an upper bound on levels of resulting contamination and dose. Weapons at risk, when exposed to unusual stress during the accident, may undergo a non-nuclear HE detonation. It is assumed that all the nuclear material at risk shall be released in an aerosolized form. Similar conservative assumptions are made where specific accident information is missing or unknown. If the accident location is not close to an ARAC-serviced CONUS site, the initial projections are not likely to include geographic features (roads, city boundaries, etc.). ARAC projected doses shall help initial response efforts evaluate the potential hazard to the general public until comprehensive radiation measurements and bioassays may be performed. Projected deposition patterns shall assist estimates of SR efforts.

AP9.3.2.7. About 60 to 90 minutes after notification of the ARAC, a more refined projection shall be available if somewhat less conservative assumptions are made in estimating the actual amount of material at risk released during the accident. (Estimates are now based on only those weapons known to have undergone an HE detonation.) For consequence analyses, the ARAC may generate a computation based on a meteorological forecast to give projected contamination patterns in case of dispersal during a weapon safing operation. Although the initial projections are shown typically on a 30 by 30-kilometer grid, these refined projections may cover either a larger or smaller area depending on the downwind extent of the contamination. Note that the ARAC may generate projection plots to match a given map scale (for example, 1:50,000) for ease of overlaying the projected deposition pattern.

AP9.3.2.8. When available, ARAC projections may be sent to the ARAC site system computer located at most ARAC serviced sites. If the site does not have a site system computer, the projections may be telefaxed. Subparagraphs AP9.3.2.8.1. through AP9.3.2.9.3. provide information on the ARAC example “initial” projections shown in figures AP9.F8. and AP9.F9., below.

AP9.3.2.8.1. <u>Geographic Contour Display</u>. Release location is centered in this area (refined projections may have release location offset from center) with a 2,000-foot fragmentation circle drawn around the release point. The display is always oriented with north toward the top. A maximum of three contoured areas shall be shown emanating from the release point that shall, in most cases, overlay a geographic representation, showing road networks and waterways, etc., of the area around the accident site. Printed across the top of each graphic display area shall be the title of the underlying computer estimation denoting either a “50-Year Whole Body Effective Dose” or “Cumulative Deposition” plot.

Figure AP9.F8. ARAC Plot: Lung Dose

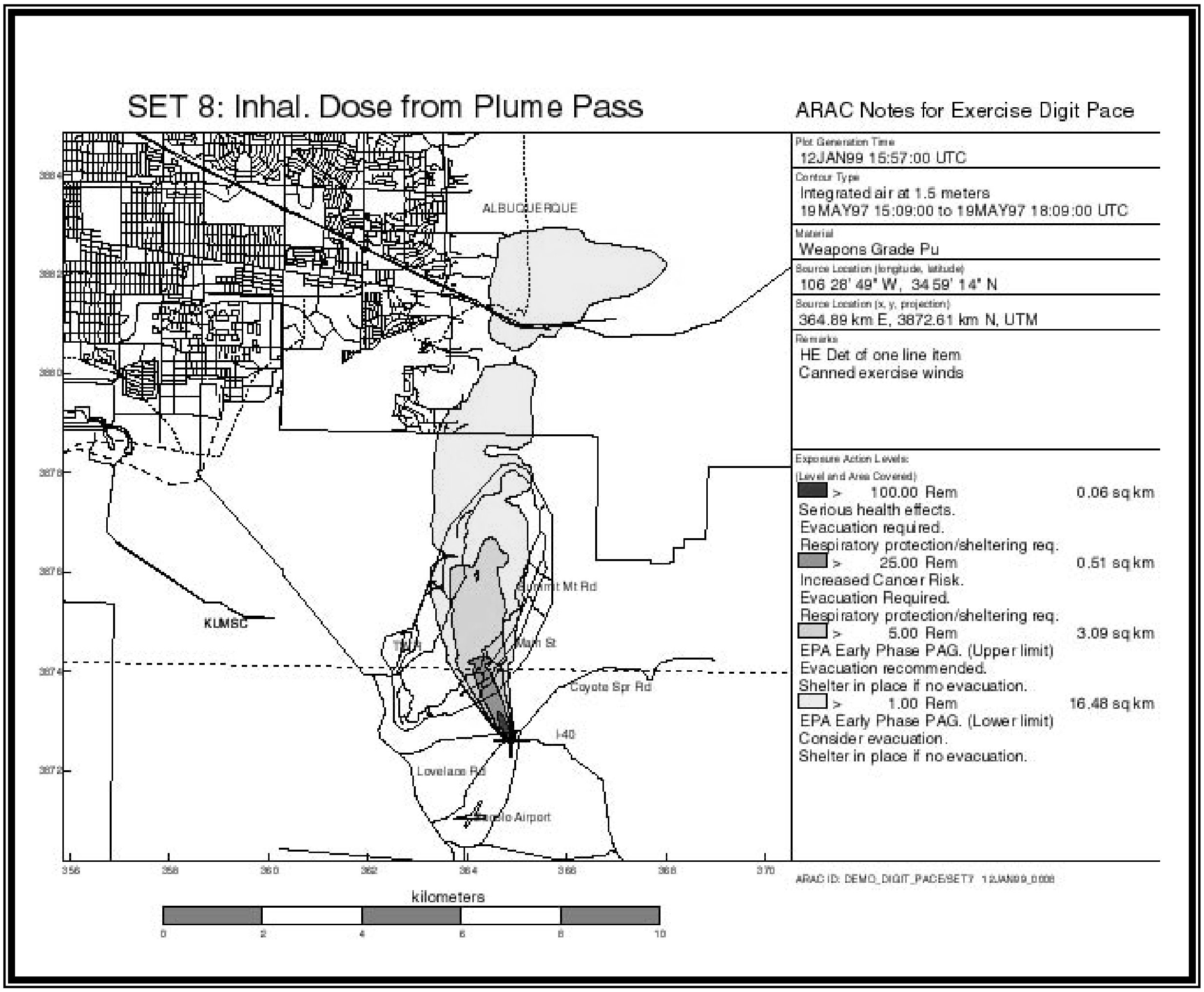
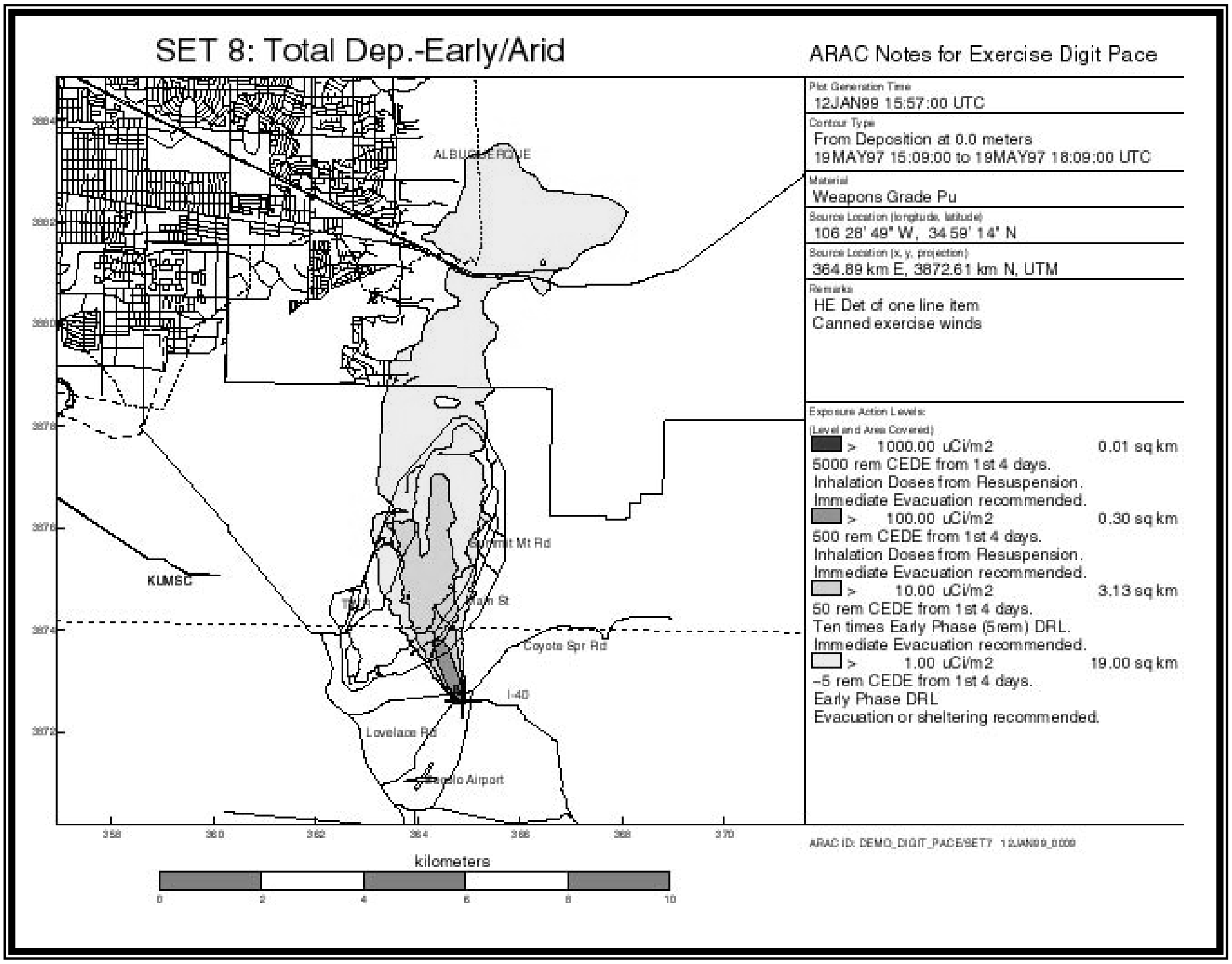


Figure AP9.F9. ARAC Plot: Deposition



AP9.3.2.8.2. Descriptive Notes. To the right of the contour display shall be a legend. The first line is a title line for these notes. The second line shall denote the date and time that the specific computer model estimation was produced. Lines three through six shall be reserved for general amplifying remarks about the computer estimation. Line seven identifies either the dose integration period or total deposition period time, as appropriate. (All times shall be shown as "Z" time. "Z" is equal to Universal Coordinated Time (UCT), which has replaced the more familiar Greenwich Mean Time.) Line nine shows the radiological material modeled, and the height above ground level at which the contour levels are computed and displayed. Lines 10 through 22 shall show the specific computer estimation action levels as computed for that particular plot. The next several lines (down to the scale of the display shown in both kilometers and feet) comprise three separate blocks of information. Within each block is an area showing a particular contour crosshatch pattern used to mark areas in the contour display where the dose or deposition is greater than the stated value, the area covered by this particular pattern in square kilometers, and abbreviated, generalized actions that may be considered within this area. Note that the area given shall include the area of all higher levels shown (for example, the area given for exceeding 25 REM is the sum of the area covered by the 25 and 150 REM contour patterns). At most, projections are made for three cumulative deposition and four dose exposure levels.

Only the areas with the three highest projected levels shall be shown on any ARAC plot. Projected cumulative depositions are for levels greater than 600, 60, and 6 $\mu Ci/m^2$. Dose exposures are projected for levels greater than 150, 25, 5, and 0.5 REM, which refer to a 50-year whole body effective dose through the inhalation pathway.

AP9.3.2.9. Wording that Accompanies the Action Levels in the Legend

AP9.3.2.9.1. 50-Year Whole Body Effective Dose "Exposure Action Levels." Projected doses apply only to people outdoors without respiratory protection from the time of the accident until the valid time of the plot, and recommended actions are to reduce the projected dose to those people exposed.

AP9.3.2.9.1.1. Greater than 50 REM. Immediate respiratory protection and evacuation recommended.

AP9.3.2.9.1.2. Greater than 25 REM. Prompt action required; respiratory protection required; consider sheltering or evacuation.

AP9.3.2.9.1.3. Greater than 5 REM. Respiratory protection required; recommend sheltering; consider evacuation.

AP9.3.2.9.1.4. Greater than 0.5 REM. Consider sheltering.

AP9.3.2.9.2. Cumulative Deposition "Exposure Action Levels"

AP9.3.2.9.2.1. Greater than 600 $\mu Ci/m^2$. Immediate action may be required until the contamination is stabilized or removed; issue sheltering instructions; recommend controlled evacuation.

AP9.3.2.9.2.2. Greater than 60 $\mu Ci/m^2$. Supervised area; issue sheltering instructions; recommend controlled evacuation for 2 to 14 days.

AP9.3.2.9.2.3. Greater than 6 $\mu Ci/m^2$. RA; access on need only basis; possible controlled evacuation required.

AP9.3.2.9.3. The wording of the deposition action levels in subparagraph AP9.3.2.9.2. was contracted because of space limitations on the ARAC plots. The full wording follows:

AP9.3.2.9.3.1. Greater than 600 $\mu Ci/m^2$. Immediate action required. Urgent remedial action may be needed from within a few hours up to two days. Full personal protective clothing and respiratory protection required by all emergency staff in this area. Residents should stay indoors with doors and windows closed. Heating, ventilation, and air conditioning (including room air conditioners) should be turned off. Controlled evacuation of children and adults should be considered urgent. All work on, or the use of, agricultural products and/or meat and poultry must be controlled and further action on them assessed.

AP9.3.2.9.3.2. Greater than 60 µCi/m². Supervised area. Controlled evacuation should be considered and may have to occur, lasting between two days and two weeks or more. All activities should be carefully considered and supervised. Full anti-contamination clothing and respirators should be required for all personnel engaged in heavy work or dusty, windy operations. Residents should stay indoors with windows closed unless evacuation is in progress or there is no significant airborne hazard and none forecasted to occur through resuspension.

AP9.3.2.9.3.3. Greater than 6 µCi/m². RA. Entry restricted to those who live, work, and/or have a need to be there. Decontamination personnel and public health and safety staff should wear limited personal protective clothing. Controlled evacuation of residents, especially children, is possible during decontamination if there is a possibility of airborne contamination through resuspension.

AP9.3.3. AMS

AP9.3.3.1. General. The DOE/NNSA AMS has four capabilities available to support a weapon accident: aerial radiological mapping; aerial search for weapons and/or weapon components; multispectral, hyperspectral, and/or thermal imagery; and aerial photography.

AP9.3.3.2. Aerial Radiological Mapping. Aerial radiological surveys provide rapid assessment and thorough coverage of large areas and yield average ground concentration of the contaminant. The system may also be used to quickly prepare lower sensitivity, but appropriately scaled, incident site maps. Instrumentation includes large volume, NaI gamma-ray detectors, data formatting and recording equipment, positioning equipment, meteorological instruments, direct readout hardware, and data analysis equipment. A variety of DOE/NNSA owned aerial platforms (fixed-wing and helicopter) are dedicated to supporting this mission. Also, equipment capable of being mounted on a variety of DoD helicopters is available to perform survey missions, as needed. The availability of North Atlantic Treaty Organization (NATO)-standard pods reduces the time required for airframe preparation.

AP9.3.3.2.1. In a nuclear weapon accident, a preliminary radiological survey would establish whether radioactive materials had been dispersed from the weapon. Dispersion patterns and relative radiation intensities, immediately available from the initial survey, may be used to guide radiation survey teams to the areas of heaviest contamination. AMS personnel shall help interpret and coordinate their information with other radiological survey data through the FRMAC. Additional data processing shall establish the identity and concentration of the isotopes involved. Later surveys might provide data on the progress of cleanup operations.

AP9.3.3.2.2. The first radiological survey conducted after a weapon accident is likely to follow this protocol and timeframe:

AP9.3.3.2.2.1. The fixed-wing aircraft should arrive 6 to 12 hours after notification.

AP9.3.3.2.2.2. The fixed-wing aircraft should be refueled and the crew should get instructions within 2 hours.

AP9.3.3.2.2.3. A survey should be conducted in a serpentine pattern of survey lines 0.5 to 5 miles apart to find:

AP9.3.3.2.2.3.1. Radiological deposition outline.

AP9.3.3.2.2.3.2. Direction of the plume centerline.

AP9.3.3.2.2.3.3. Approximate radiation levels along the plume centerline.

AP9.3.3.2.2.3.4. Dominant isotopes.

AP9.3.3.2.2.4. The survey information should be sent by radio or satellite telephone to the FRMAC during the survey.

AP9.3.3.2.2.5. The analysis laboratory should arrive four hours (plus driving time) after notification.

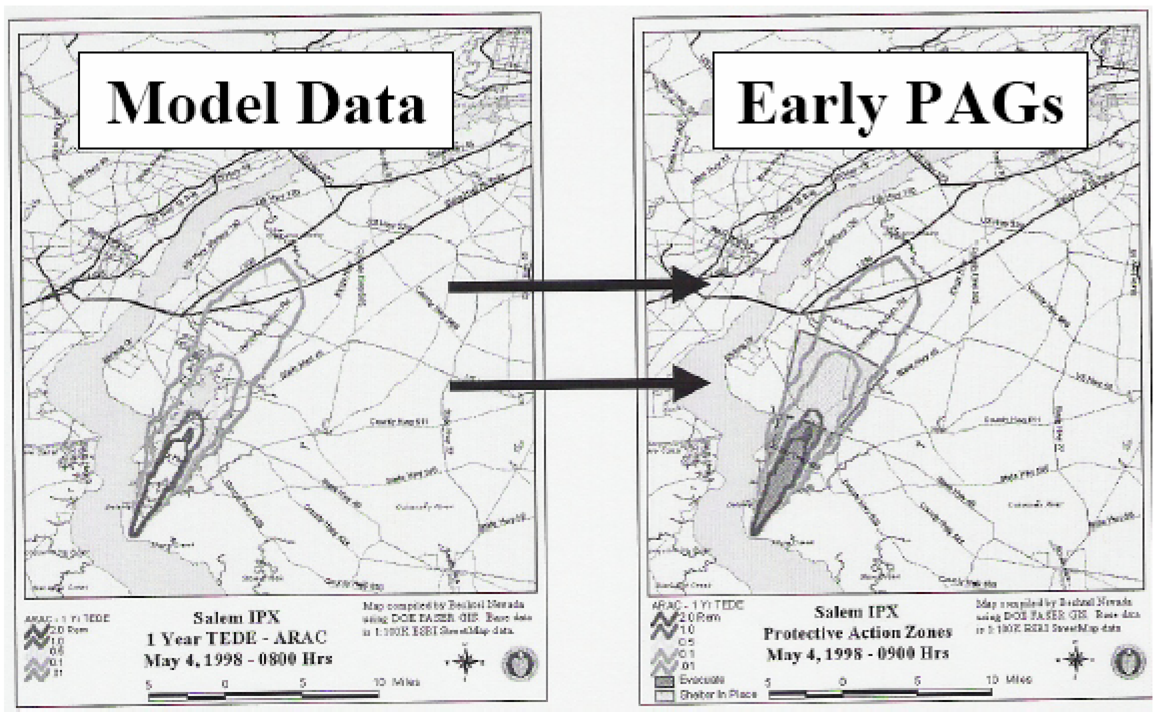
AP9.3.3.2.2.6. Full analysis of flight results should be available six to 12 hours after the flight is completed or after the analysis laboratory arrives.

AP9.3.3.2.3. After the first broad survey is completed, a series of smaller area surveys should be initiated with the AMS helicopter. The flight altitude is likely to be 100 to 150 feet with 200-foot line spacings. The AMS helicopter has a detector field of view around 300 feet in diameter. The purpose of these surveys should be to map the contaminated area in detail. The length of time required to complete this series of surveys may be from one to five days, depending on the area to be surveyed and the weather.

AP9.3.3.2.4. Another survey that might be initiated is called the KIWI. The KIWI uses the same system used on a helicopter, but is mounted on a four-wheel drive vehicle instead. Unlike the AMS helicopter, the KIWI is about three feet above the ground and has a detector field of view around 10 feet in diameter. The KIWI gives a high-spatial resolution mapping of contamination.

AP9.3.3.2.5. The results of an aerial survey to produce early phase radiological data and radiological data measurements are shown in figures AP9.F10. through AP9.F12., below.

Figure AP9.F10. Aerial Survey Results: Early Phase Radiological Data



Legend:
ESRI: Environmental Systems Research Institute
IPX: Ingestion Pathway Exercise
TEDE: Total Effective Dose Equivalent
DOE FASER GIS: DOE Field Analysis System for Emergency Response, Geographic Information System

Figure AP9.F11. Aerial Survey Results: Radiological Data Measurements, AMS Serpentine, and Field Measurements

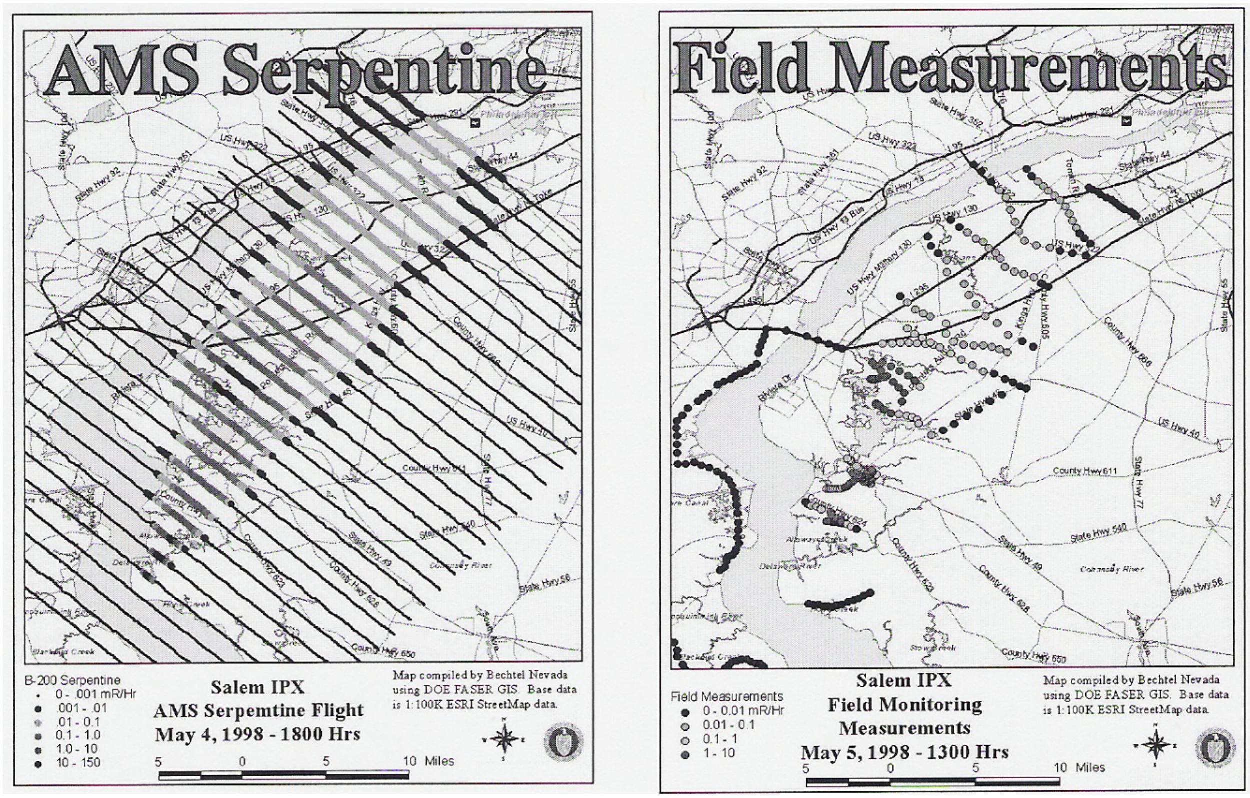
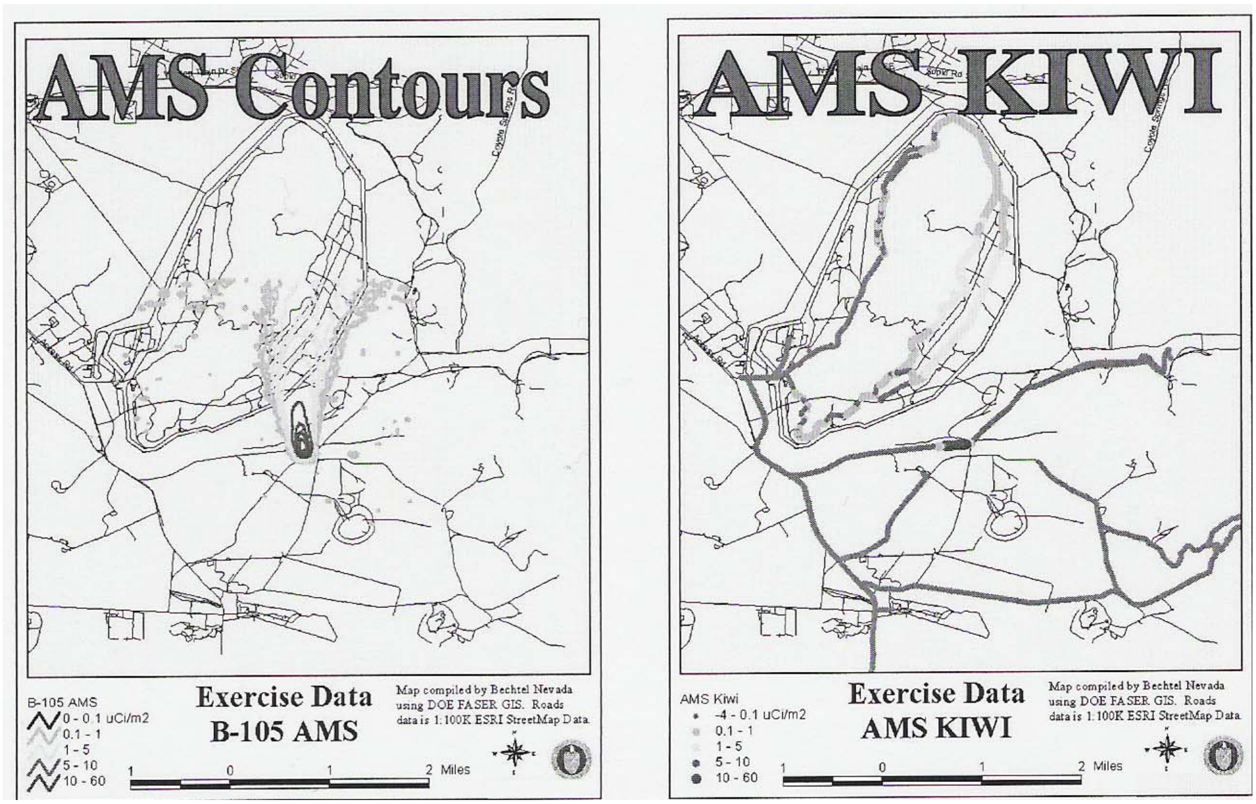


Figure AP9.F12. <u>Aerial Survey Results: Radiological Data Measurements, AMS Contours, and AMS KIWI</u>



AP9.3.3.2.6. The sensitivity of the system depends on the flight altitude, area of contamination, and the interference of other isotopes (both natural and manmade). Experience has shown that the lower level of detectability of Am-241 may be expected to be 0.03 to l.0 $\mu Ci/m^2$, and 0.03 to 0.3 $\mu Ci/m^2$ for both Cesium-137 and Iodine-131. The americium concentrations shown are on the order of 1 to 10 $\mu Ci/m^2$ of plutonium.

AP9.3.3.2.7. Comparison with ground-based survey and sample results should be done with caution. The area sampled in a single aerial measurement is on the order of 1,000 times the area sampled by a FIDLER-type instrument at one foot above the ground and 1,000,000 times larger than the area sampled by an alpha probe or a soil sample. The aerial survey results weight the average of each scale and take into account the overall effect of roads, ditches, water bodies, vegetation cover, and terrain effects.

AP9.3.3.3. <u>Aerial Search</u>. In certain scenarios, the aerial search capabilities available from AMS capabilities may need to be used. These consist of gamma and neutron detector modules designed for the DOE/NNSA owned B0-105 or Bell 412 helicopters or portable modules that may be used in helicopters, such as the UH-60 and UH-I with appropriate modifications. This capability may be useful only for certain sources of known detectability and usually requires low altitudes (100 feet or less) and slow speeds (about 60 knots). Aerial search

personnel shall be able to determine the appropriate flight limits when notified of the particular scenario.

AP9.3.3.4. Aerial Multispectral, Hyperspectral, and/or Thermal Imagery. Aerial imagery using a variety of sophisticated sensor suites may be used to find debris that has scattered around the accident site. Rigorous analyses allow for specific georeferences to be applied to each pixel of an image.

AP9.3.3.5. Aerial Photography. Two major photographic systems are used to acquire detailed aerial photos over a site. One system consists of a large format aerial mapping camera operated in fixed-wing aircraft, which produces detailed aerial photographs. A second system operates out of helicopters, using the Hasselblad 70mm cameras to produce color photographs. Film from the Hasselblad system may be produced and printed under field conditions. Large prints up to 20 x 24 inches produced to map scales may be printed on–site, usually within hours of the completion of the flight. Digital photography is also available.

AP10. APPENDIX 10

CONTAMINATION CONTROL

AP10.1. GENERAL

Contamination control reduces the spread of contamination; therefore, rigid, established operating procedures must be followed to achieve the objective of contamination control. Procedures consists of:

AP10.1.1. Initial monitoring on arrival to determine the preliminary site characterization and personnel contamination.

AP10.1.2. Anti-contamination procedures to reduce the spread of contamination.

AP10.1.3. Strict CCL procedures to control contamination spread during response, recovery, and/or remediation operations.

AP10.1.4. A contamination control capability must be available on-site beginning with the IRF initial reconnaissance through to RTF final recovery operations. It is imperative to personnel safety that a CCS is established and operating while personnel are in the contaminated area.

AP10.2. PERSONNEL MONITORING AND DECONTAMINATION

Personnel who were potentially exposed during the accident, later cloud passage, or post-accident entry into the contaminated area should be given a high priority in response actions. People to be considered include casualties, bystanders and sightseers, military and civilian response personnel, residents, business employees, and customers in the contaminated area. Early definition of the perimeter is important so that potentially contaminated people may be identified and measures taken to prevent the contamination of additional people. Initially, the military may have the only effective radiation detection instruments at the scene and may monitor potentially contaminated civilians. Responsibility for monitoring civilians shall shift to the DOE, State radiation control personnel, or civilian authorities and/or representatives as they arrive on-scene with appropriate instruments. Personnel are usually monitored at a CCS; however, during the initial response when the number of radiation detection instruments and monitoring personnel is limited, alternative procedures must be devised if large numbers of people are involved. Depending on resources and requirements, the IRF and/or RTF Commander may decide to establish more than one CCS. If sufficient resources exist to support multiple stations, processing contaminated or potentially contaminated civilian residents through a station separate from that used for response force personnel may be desirable.

AP10.2.1. Monitoring and Decontaminating Potentially Exposed Medical Treatment Facilities. Immediately after an accident, injured personnel may be removed for medical

treatment, or fatalities may be moved to a hospital or morgue without being monitored for contamination. The potential contamination of a medical treatment facility, morgue, or ambulance might present a health problem for the staff and other patients. Therefore, judgments must be made as to whether casualties have been removed from the contaminated area and, if so, what facilities are involved. Those facilities and the transportation resources used should be notified of the potential problem. Section C11.5. describes procedures a medical facility may use to control the spread of contamination. Dispatch of a radiological monitoring team to check the vehicles and facilities involved for contamination, and to assist in decontamination or other measures, as appropriate, to prevent the spread of contamination should be given the highest priority.

AP10.2.2. <u>The CCS</u>

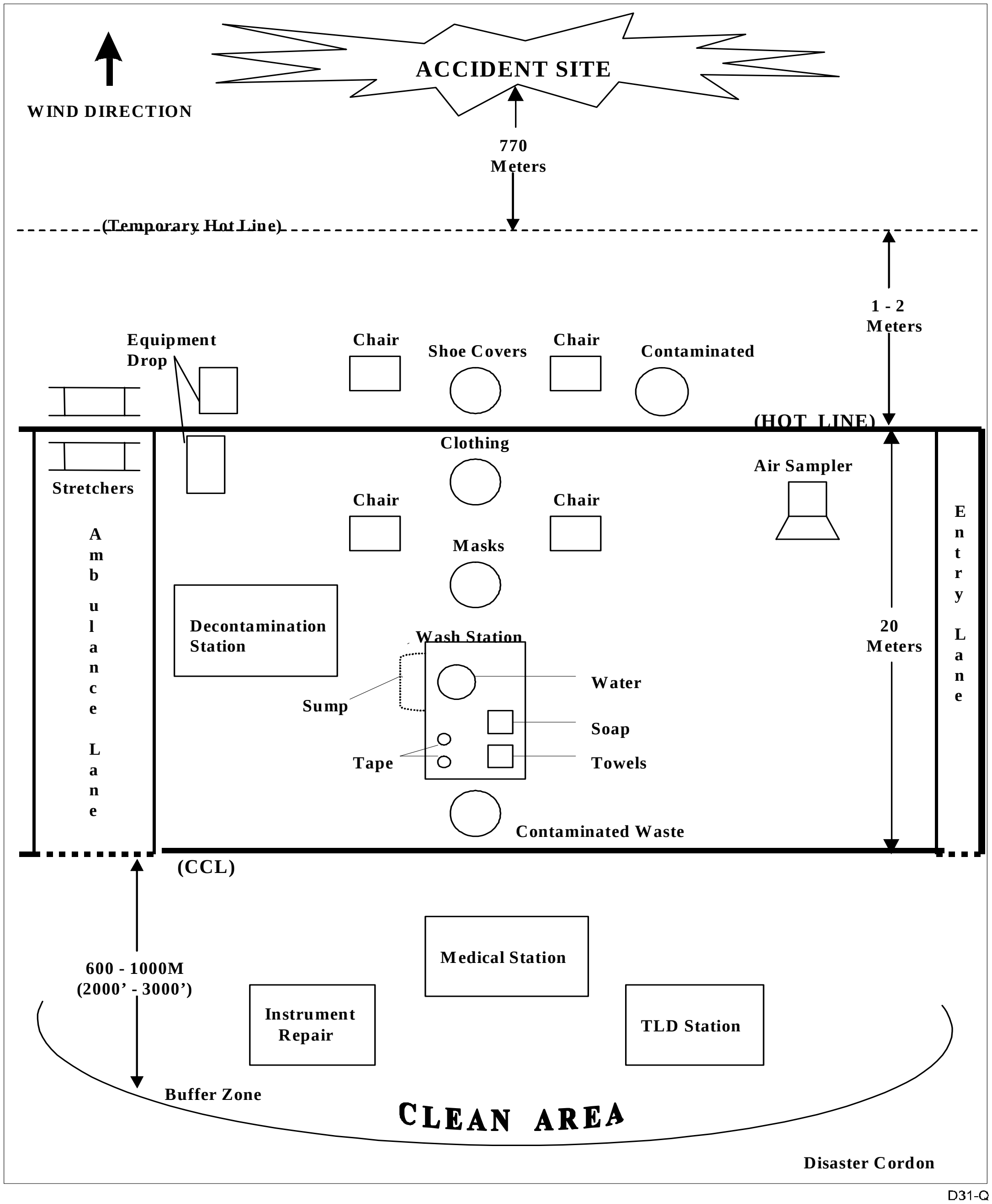
AP10.2.2.1. The CCS is used to ensure radioactive contamination is not transferred from an area that is already contaminated to an area that is not contaminated through the orderly processing of personnel, equipment, and vehicles entering and leaving the contaminated area. The quantities of material, workforce requirements, and physical layout of the CCS discussed in this appendix are notional and are provided for information only. The actual amounts of material used and physical location of CCS elements shall depend on conditions on-scene at an actual accident.

AP10.2.2.2. Persons present at the accident site or in known contaminated areas must be identified and screened to determine whether decontamination or other corrective action is required. Usually this action is done at a CCS. Casualties should be monitored and decontaminated to the extent injuries allow; however, urgent medical treatment has priority and exceptions may be necessary. Procedures for handling contaminated casualties are outlined in Chapter 11. An example of a CCS is shown in figure AP10.F1., below. When processing a large group of people, this type of station shall process a person about every four minutes if no contamination is found. If equipment and monitors are available, additional lines should be established in the station to process large numbers of people. When processing people whose personal clothing is contaminated, the clothing should be bagged separately and a receipt issued for those articles kept. A priority system should be established to allow immediate processing of EOD personnel, monitoring team leaders, and others whose presence or information is needed to ease other response operations. The location of the CCS should be governed by the following constraints:

AP10.2.2.2.1. It must be in an area free of contamination.

AP10.2.2.2.2. Ideally, it should be directly upwind of the accident, but terrain or other considerations may dictate another location. If not upwind, it must be far enough away to prevent airborne or resuspended contamination from entering the CCS.

Figure AP10.F1. Personnel CCS (Example)



AP10.2.2.2.3. Initially, it should be outside the fragmentation zone and beyond the perimeter of the contaminated area. After all explosives have been rendered safe, the CCS may be moved closer to the accident site, if appropriate.

AP10.2.2.2.4. It should be in an area relatively free of weeds, bushes, and rocks. A paved or flat compacted surface is recommended. Select an area away from drainage ditches, sewers, or similar features that might collect contamination from the CCS and distribute it throughout a wide area. If the CCS must be established near these areas, dam or dyke the entry or downstream area to prevent uncontrolled runoff or contamination spread.

AP10.2.3. Materials and Workforce

AP10.2.3.1. Where possible, videotape the CCS processing to help identify personnel who process through the CCS, support post-accident assessment, and for inclusion in the permanent event record. Videotape is particularly useful when large numbers of people are processed through the CCS by the first responders. If videotape capability is not available, use still photography to record CCS events.

AP10.2.3.2 The materials listed in table AP10.T1., below, are necessary to establish a CCS. Some items are expendable and need replacement over time. Suitable items may be substituted, as necessary. Frequency and volume of personnel and equipment processing shall determine if additional items are needed. Use of National Stock Numbers (NSNs) when ordering shall speed the process. Add additional equipment and supplies, such as cold weather or rain gear, to enable operations under the expected local environmental conditions.

Table AP10.T1. CCS Materials List

Equipment	**Quantity**
Alpha particle monitoring equipment	4
Lighting for night operations	as needed
Low-level beta and/or gamma monitoring instrument	4
Dosimeters	as needed
2-inch or wider masking tape	3 rolls
NBC marking kit or substitute	1
Stools or chairs	4
55-gallon drums or equivalent for storing contaminated items	4
Plastic bags; sized to fit the barrels and/or drums used	20
Brushes	4
Whisk brooms	4
Shovels	4
Traffic cones, ropes, and stakes	as needed
Protective masks (SCBA, if available)	as needed
Personal Protective suits	as needed
Cotton gloves	as needed
Booties or foot covers	as needed
Water container; 5 gallons or larger	1
Paper towels or substitute	as required
Liquid soap; 1 gallon or more	1
Tables	5
Craft paper, butcher paper, or substitute	1 roll

Table AP10.T1. CCS Materials List, continued

Rain suits, ponchos, or substitute	as needed
Surgical masks	1 box
Organic solvents; 1 gallon or more	1
Large tent (20 or 40 men) or trailer with popup sun covers	as needed
Portable generator (as needed)	1
Portable heaters, air-conditioners, fans	as needed
Blankets	as needed
Litters	4
Plastic sheeting	1 roll
Bar Soap (Dozen) and/or Shampoo	as needed
Towels	as needed
Cotton Swabs	as needed
Bioassay Containers	as needed
Hair Brushes	as needed

AP10.2.3.3. Each shift of the CCS must have the personnel listed in table AP10.T2., below. All should be dressed in personal protective suits and masks. Volume and frequency of equipment and personnel processing shall determine if more are needed.

Table AP10.T2. CCS Personnel

Position	Function
One medical doctor	Monitor general health and treat personnel injuries.
One health physicist	Monitor personnel, area, and facilities for contamination; estimates exposure and assesses effectiveness of decontamination and other contamination control measures.
One CCS supervisor	Monitor supply levels and control flow through the CCS.
One security guard	Monitor for unauthorized or unprocessed access and/or egress.
Eight assistants	Accomplish activities as directed by the CCS supervisor.
One RADIAC repair person	Repair any RADIAC equipment from the CCS.
One TLD and/or dosimeter monitor	Issue dosimetry, log out and log in personnel that go to and from site.

AP10.2.4. Procedures for Personnel Entering the Contaminated Area

AP10.2.4.1. Dressout procedures:

AP10.2.4.1.1. Don personal protective suits or coveralls.

AP10.2.4.1.2. Using masking tape, write the individual's name and team name or function on the front and back of each suit.

AP10.2.4.1.3. Put on shoe covers.

AP10.2.4.1.4. Using masking tape, tape the bottom of the suit legs over the top of the shoe covers.

AP10.2.4.1.5. Don and adjust mask; then remove.

AP10.2.4.1.6. Ensure that all equipment has been functionally checked before donning gloves.

AP10.2.4.1.7. Don gloves.

AP10.2.4.1.8. Using masking tape, tape the end of sleeves over the gloves.

AP10.2.4.1.9. Put on mask.

AP10.2.4.1.10. Don hood and tape the bottom of the hood to the coveralls. For masks without an integral hood, tape the opening of the protective garment hood to the edge of the mask.

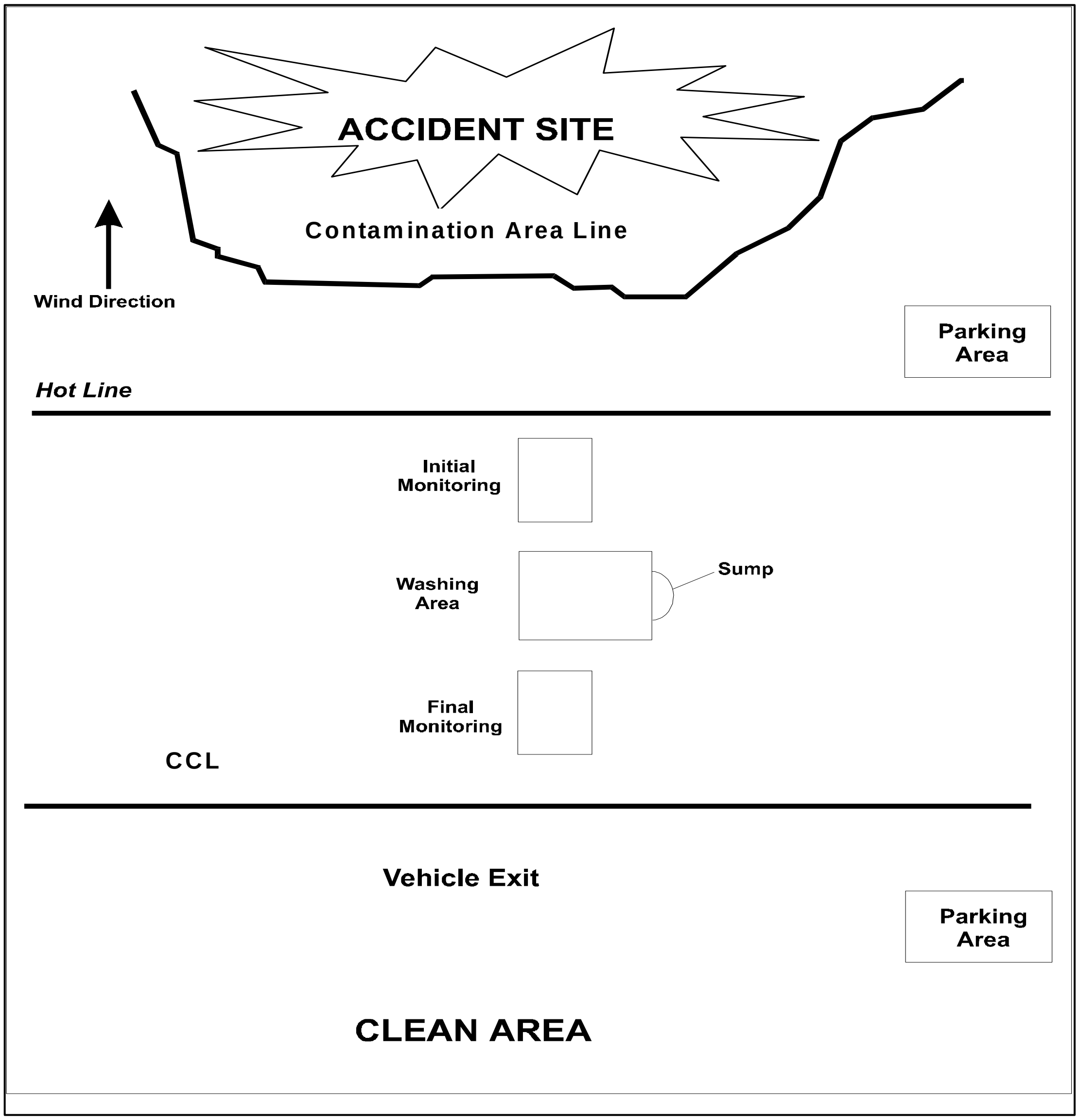
AP10.2.5. CCS Processing. If an accident occurs near a populated area and several hundred people are potentially contaminated, available radiation detection instruments and monitoring personnel may be inadequate to process the people fully and quickly. The assumption is that the potentially contaminated people are not response personnel. If only a few radiation detection instruments are available, use of an abbreviated monitoring procedure may be considered to speed processing. The hands, seat, and shoes or lower legs may be contaminated by handling contaminated objects or moving and sitting in contaminated areas. Contamination of the upper chest or neck and head area is indicative of exposure to airborne contamination. Contamination around the nose or mouth is an indicator of internal contamination. Nasal swipes should be used to follow up on individuals with positive indications of contamination around the nose and mouth. If radiation detection instruments are unavailable to monitor the people involved, procedures to decontaminate all people coming from the contaminated area should be used immediately. Provisions should be made to monitor them later when instruments are available. Such a procedure should require provisions to collect and receipt for clothing, shower and shampoo the people, and issue replacement clothing. Each article of clothing should be bagged separately, if possible, and all clothing placed in a single large bag for which a receipt is issued. Watches, jewelry, and the contents of pockets and pocketbooks should not be highly contaminated, if at all, and should be kept by the individual. If those items are highly contaminated they should be inventoried, bagged, and an itemized receipt issued. Although the contamination may be kept with the clothing, an overriding need exists to assure the people that they are being cared for; therefore, a gym or other facility with dressing rooms and high capacity showers may be appropriate for processing people. Soap, shampoo, towels, and stocks of replacement clothing must be obtained. People processed in this manner, and their collected clothing, should be monitored as soon as possible. Uncontaminated clothing should be returned at the earliest possible time.

AP10.3. VEHICLE MONITORING

Vehicles used by the response force in the contaminated area shall stay there for future use and not require immediate monitoring or decontamination. After the initial response, focus

decontamination efforts on fire trucks and ambulances to reduce the possibility of contamination spread if these vehicles must respond to other incidents outside of the contaminated area. If members of the public in the contaminated area are sent, or go, to the CCS or other processing points using their own vehicles, the vehicle should be monitored before being moved away from the area. An example of a vehicle CCS is shown in figure AP10.F2., below. All outer surfaces and the air filter may have been contaminated by airborne contamination, while wheel wells, tires, and the rear end may be contaminated from driving across contaminated areas. Unless the windows were down, or ventilators open, detectable contamination of the interior is most likely on those surfaces in contact with the vehicle occupants, for example, floorboards and seats. If only external surfaces of a vehicle are contaminated, decontamination should be relatively easy to perform, if done before bonding between the contaminant and the vehicle paint occurs. Also, rapid decontamination and return of private vehicles may reassure the public that their interests and property are being considered. Monitoring and decontaminating vehicles is time consuming and may not yield a "clean" vehicle. Recommend individuals drive to multiple collection sites, park, and transfer to commuter buses for transport to CCS areas. The vehicles may be monitored, time permitting, without spreading contamination.

Figure AP10.F2. Vehicle CCS (Example)



AP11. APPENDIX 11

RESPIRATORY AND PERSONNEL PROTECTION

AP11.1. GENERAL

During a radiological emergency, health officials must act to protect the public and response forces from potential health hazards associated with the emergency. This appendix addresses protective clothing and respiratory protection including PFs, PAG, and RFs.

AP11.2. RESPIRATORY PROTECTION

Plutonium and uranium particulates are the most serious source of airborne radioactivity at an accident site unless fusion has occurred. These particulates may be present in the cloud and smoke from a breached or burning weapon, but settle to the ground shortly thereafter. The radioactive particles may become resuspended in the air by surface winds and by soil disturbing operations, including vehicular traffic. Resuspension is highly dependent on specific conditions (for example, type and condition of soil or surface, vegetation, moisture present, and time since deposition) and is difficult to measure and predict. Respiratory protection prevents airborne contamination from entering the lungs and is provided by an SCBA, or respirators that filter particulates out of the ambient air. Respiratory protection devices adversely affect productivity and effectiveness and their use is not recommended except when airborne contamination is present or expected. In hot climates, respiratory protection devices may result in heat injuries, including death, and a heat injury prevention program, as discussed in Chapter 11, should be implemented when temperatures exceed 70 °F.

AP11.2.1. PFs. The amount of protection from inhaling airborne particulate contaminants provided by a given device is called its PF. PFs vary mainly as a function of anthropometrical data, mask fit, and mask design. PFs are determined by dividing the Ambient Air Concentrations (AACs) of a contaminant by the Inhaled Concentration (IC) or amount of contaminant that enters the mask; so PF = AAC/IC. A test facility and/or chamber using probe equipped test masks in a chamber containing a nontoxic contaminant is required for quantitative tests to determine the PF for each individual. A deployable fit test facility may be obtained through the JNACC. PFs of up to 2,000 may be achieved with properly fitted respirators. If the mask passes a qualitative smoke test around the edges of the mask it is assumed a PF above the nominal value is achieved. Demand type SCBAs (air supplied on inhalation) cause negative mask pressure during inhalation and provide no more protection from contaminants than a respirator. Pressure demand SCBAs (i.e., always under positive pressure) provide a nominal PF of 10,000. Units may use local mask fit test instruments, such as the M-41 Protection Assessment Test System or commercial equivalent, to verify PFs for first responders.

AP11.2.2. PAGs. PAGs are developed to identify protective devices to limit exposure to the lungs from inhaling contaminants to agreed-on limits. Since most responders are not radiation workers, i.e., they are neither formally trained nor medically examined, the appropriate Derived

Air Concentration (DAC), should be that in reference (bn). The DAC for Pu-239 is 3 x 10^{-7} microbequerel/m^3 for plutonium in non-chemically active forms that should be expected after a fire. This corresponds to 18 dpm/m^3 as the lower level in table AP11.T1., below.

AP11.2.3. The guidelines provided in table AP11.T1. are intended for use until health physics personnel at the scene may develop situation-specific instructions. In deriving the guidelines, a PF of 100 was assumed and the Maximum Permissible Concentration (MPC) of activity in the air being inhaled was based on an MPC for radiation workers of 40 picocuries/cubic meter (pCi/m^3) per 40-hour week. This computation assumes possible exposures at this rate over the period of a year and is about 10 times greater than the 1 pCi/m^3/168-hour week MPC for the general public. Radiation dose is a function of level of activity and exposure time; therefore, if exposure time of workers is being tracked, a person might be allowed to enter an area of higher activity without adequate respiratory protection for a shorter period of time without exceeding dose limits.

AP11.2.4. In many areas, especially during thermal inversions, radon daughter products may be detected in air samples. A background sample of the same length and counted the same time after collection as the on-scene sample allows proper background subtraction; however, typical radon concentrations completely mask 18 dpm/m^3. Samples should be recounted at about 20-minute intervals, the rough half-life of radon daughter products. When the measured activity stays near constant, the residual activity consists of actual contamination and a possible, but usually small, contribution from thoron daughter products that is easily subtracted by background measurements.

AP11.2.5. The time versus dose approach should be applied in emergencies, as appropriate; that is, if a person suffers heat stroke, the respirator should be removed immediately to meet the urgent medical requirement to cool the person, since the short unprotected exposure during evacuation from the area for treatment limits the amount of contaminant that is inhaled.
Table AP11.T1. shows respiratory protection guidelines to use when air sampling data provide a basis for assessing airborne contamination levels. Computed activity levels should be corrected for background activity before entering the table.

Table AP11.T1. Recommended Respiratory Protection Levels for Emergency Workers as a Function of Airborne Contamination

Airborne Alpha Activity dpm/m^3 above background	**Respiratory Protection**
Below 100 dpm/m^3	No respiratory protection needed.
100 to 10,000 dpm/m^3	Full-face respiratory protection required (M-series Protective Mask or National Institute of Occupational Safety and Health/ Mine Safety and Health Administration approved High Efficiency Particulate Air (HEPA) respirator).
Above 10,000 dpm/m^3	Pressure demand SCBA or limited entry restricted to essential personnel wearing full-face respiratory protection. Source of contamination should be fixed as soon as possible.

AP11.2.6. Air sampling data are unavailable until some time after response personnel have arrived on-scene. During the initial response, and when working in areas where available air sampling data may not be applicable, the use of tables AP11.T2. or AP11.T3., below, is recommended. Tables AP11.T2. and AP11.T3. provide guidelines for protective requirements based on measurements of surface contamination levels. The recommendations in table AP11.T2. provide guidelines for personal protective measures that may be taken by first responders until the situation may be evaluated by health physics personnel. Conversions from μCi/m² to CPM were made using the equations in tables AP13.T1. through AP13.T7., below, for measurements on soil. Using table AP11.T2. is appropriate during the initial approach to the area when using respirators in uncontaminated areas may create undue public alarm. If contamination levels detected during the initial approach show high levels of contamination, people entering the contaminated area should wear respirators until air sampling data are available to assess the actual airborne hazard. Table AP11.T2. guidelines should not be used in the downwind area until after the contamination cloud released by the accident has dispersed (several hours after the fire is extinguished or after the explosion).

Table AP11.T2. Protective Devices for Emergency Workers as a Function of Surface Contamination

Surface Contamination μCi/m²	**Respiratory Protection**
< 6	No respiratory protection or protective clothing.
6 to < 60	No respiratory protection for limited entries of up to 4 hours. Full protective clothing.
60 to < 600	Air purifying respirator and full protective clothing.
Above 600	Wear pressure demand SCBA and full protective clothing. Source of contamination should be fixed as soon as possible.

Table AP11.T3. Protective Devices for Emergency Workers as a Function of Surface Contamination Using the ADM-300

Surface Contamination CPM	**μCi/m2**	**Respiratory Protection**
< 20,000	<6	No respiratory protection or protective clothing.
20,000 to 200,000	6 to <60	No respiratory protection for limited entries of up to 4 hours. Full protective clothing.
200,000 to 2,000,000	60 to <600	Air purifying respirator and full protective clothing.
Above 2,000,000	Above 600	Wear pressure demand SCBA and full protective clothing. Source of contamination should be fixed as soon as possible.

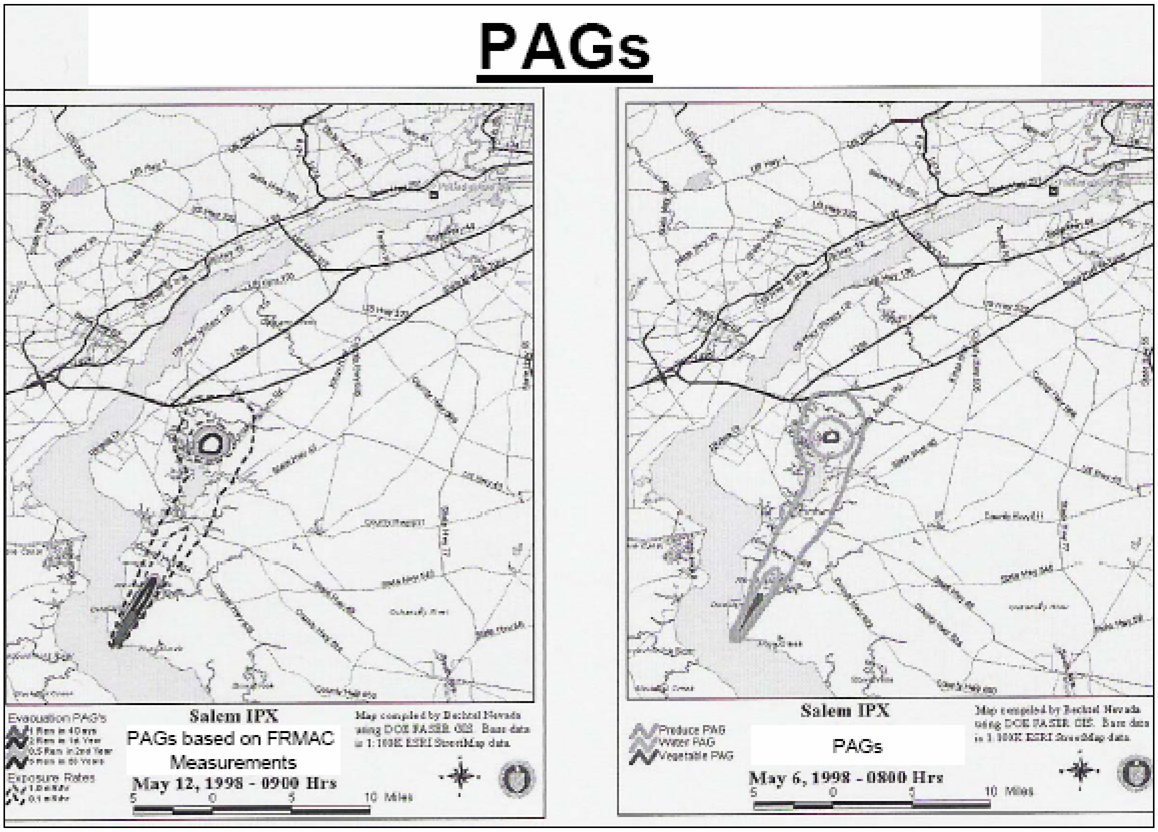
AP11.2.7. PAGs. To ease decision making during radiological emergencies, the EPA and the FDA have developed PAGs to guide the actions (e.g., sheltering, evacuation, food embargoes, etc.) taken to lessen the health consequences of an accident and/or emergency. These guides allow for various actions to be taken to protect human health, and for State and local officials to develop emergency response plans. A PAG is the projected dose (to a reference individual) from an unplanned release of radioactive material at which a specific protective action to reduce or avoid that dose is warranted. It is important to note that PAG dose values include only the future dose that may be avoided by taking the specific protective action considered. Example PAGs are shown in figure AP11.F1. Not all PAGs are the same as those in figure AP11.F1.; some may be depicted as charts, graphs, tables, etc.

Table AP11.T4. PAG Hazard Values

REM Levels	**Recommended Actions**
> 5 REM to 25 REM	Workers performing emergency services for saving lives or protecting large populations. (NARAC > 5 REM contour)
> 25 REM	same as above except voluntary only (NARAC > 25 REM contour)
1 – 5 REM	evacuate and/or consider sheltering (NARAC > 1 REM contour)
< 1 REM	consider sheltering

AP11.2.8. Air Sampler Equipment. Commonly referred to as a Staplex®, the TF-1A is capable of sampling air for particles down to 0.01 microns in diameter, depending on the filter paper used. A flow meter is used to determine rate of air flow. Cellulose filters are usually used and kept for laboratory analysis. Field estimates of airborne contamination may be derived from measuring filter contamination with field survey instruments.

Figure AP11.F1. Aerial Survey Results: PAGs, Evacuation PAGs, and Quarantine Areas



AP11.2.9. RFs. Other than during the initial release of contamination, airborne radioactivity is caused by resuspension. One means of estimating the potential airborne hazard caused by a given level of surface contamination is by using RFs. The RF is defined as the activity in the air (µCi, pounds per square inch, dpm, etc.) per unit volume (usually m^3) divided by the activity on the ground below expressed in the same activity unit per unit area. The dimension of the RF is then inverse length, usually m^{-1}.

Figure AP11.F2. Equation for Calculating RF

$$RF = \frac{\text{airborne activity}}{\text{ground activity}} = \frac{dpm / m^3}{dpm / m^2} = m^{-1}$$

AP11.2.9.1. Appendix 7 explains the method of computing airborne contamination levels. In theory, the surface is assumed to have an infinite plane of uniform texture with a uniform level of contamination. In practice, the contaminated area has varied levels of contamination, is finite in size, and may contain a variety of surfaces with different resuspension characteristics. For wind speeds below 20 mph, only those surfaces within about 200 m may contribute to the airborne contamination. For wind speeds of more than 30 mph, surfaces as much as 900 m away may contribute.

AP11.2.9.2. Averaging ground activity levels from these areas may be considered when computing RFs. RFs may provide a method of roughly estimating airborne contamination levels for use with table AP11.T1. in areas where air sampling data are unavailable. When using RFs to estimate airborne contamination levels, the types and levels of contamination on surfaces in the area where the RF was computed and those in the area of interest should be considered. RFs may vary from 10^{-5} to 10^{-7} for plutonium newly deposited on soil and up to 10^{-3} on pavement. RFs are affected by:

AP11.2.9.3. Soil Disturbing Operations. Mechanical disturbance, such as vehicular traffic may increase RFs by as much as 100 times in the vicinity of the disturbance.

AP11.2.9.4. Wind. RFs vary proportionally to the cube of the wind speed.

AP11.2.9.5. Rain or Moisture. Leaching of plutonium into the soil by rain or sprinkling may reduce RFs by 10 to 100 times or more. Surface and airborne alpha contamination levels may not be measurable with an alpha meter for some time after rain or sprinkling due to the shielding action of the moisture.

AP11.3. PROTECTIVE CLOTHING

Any close weave cotton material or disposable suits may protect against contamination. The outfit includes the standard anti-contamination coveralls, boot covers, gloves, mask, and hood. The outfit openings should be taped using masking or other appropriate adhesive tape. The Battle Dress Overgarment or Chemical Protective Overgarment with protective mask, overboots, gloves, and hood also provides protection from contamination. Refer to Service guidelines for use of this equipment. For identification, the person's name and team should be written on tape and placed on his or her back and chest.

AP11.4. PERSONAL SAFETY PRECAUTIONS

AP11.4.1. Do not eat, chew, smoke, or drink in areas where radioactive materials are handled.

AP11.4.2. Handle radioactive material only when necessary and keep handling time as short as possible. Health hazards are increased by extended exposure. Flaking, scratches, and fractures of radioactive material are sources of contamination. Do not handle radioactive materials with bare hands.

AP11.4.3. If wounded by a contaminated item or while in a contaminated area, take the following steps (the steps in subparagraphs AP11.4.3.4. through AP11.4.3.7. do not apply to tritium exposure or contamination):

AP11.4.3.1. Leave the contaminated area.

AP11.4.3.2. Remove contaminated clothing or contaminated material at the decontamination line.

AP11.4.3.3. Get medical assistance as soon as possible.

AP11.4.3.4. Irrigate the wound with copious amounts of water. Do not induce bleeding. Pack the wound with gauze and wrap tightly with a Curlex® or Ace® bandage. Remove the dressing at medical treatment facility and check the dressing for contamination. To detect the presence of contamination in the wound, you must swab it with a cotton-tipped applicator, dry the applicator, and monitor it in a counting chamber. The liquids present in the wound mask almost all emissions.

AP11.4.3.5. Wound debridement should not be attempted outside of a medical treatment facility. The wound should only be irrigated, packed loosely with sterile gauze, and wrapped. Debridement must take place in an emergency room or operating room. An appropriate survey instrument and technician must be available during treatment to confirm the wound has been decontaminated before closure. Wound debridement must not be continued to the point of functional compromise. If contamination is still suspected, again, pack the wound with sterile gauze, wrap, and redress the wound in 24 hours. The wound should not be sutured closed but should be allowed to heal by second intention (tissue granulation).

AP11.4.3.6. Do not check the wound for contamination without a cotton-tipped applicator or gauze swab. It must be allowed to dry and before being counted.

AP11.4.3.7. Any metallic particles must be assumed to be radioactive unless confirmed otherwise. Handling tongs and a lead pig should be standing by during wound debridement to receive a “hot particle” or metal foreign body.

AP11.4.4. If any form of internal contamination is suspected, immediately report to a medical authority.

AP12. APPENDIX 12

RADIOLOGICAL MONITORING, MEASUREMENT, AND CONTROL FORMS

AP12.1. INTRODUCTION

AP12.1.1. The FRMAC Monitoring and Sampling Working Group has developed universal radiological field monitoring and sampling forms that may be used by a variety of emergency response organizations. Although designed by the FRMAC, input was gathered from the ARG, the RAP, and other emergency response agencies to ensure that the forms may be applied to a variety of organizations. These forms can be found at http://www.nv.doe.gov/programs/frmac /forms.htm.

AP12.1.2. The working group hopes that radiological emergency response organizations throughout the nation are able to incorporate these forms into their organization's response procedures. During an emergency response, different agencies often work together and share a common workforce. Common forms allow for better exchange of data and few entry errors during a major radiological emergency response.

AP12.2. FORMS

AP12.2.1. FRMAC Form l: Field Monitoring Log. This log is used by Monitoring and Sampling teams to record field monitoring data and sample collection by sample number.

AP12.2.2. FRMAC Form 2: Sample Control Form. This form is used to document appropriate information as a sample is collected by a Monitoring and Sampling team. One form accompanies each sample to the Sample Receiving Line and from there to the laboratory. Use only one form for each sample.

AP12.2.3. FRMAC Form 3: Team, Instrument, and Equipment Information Log. This form is completed and submitted to the Field Team Supervisor before leaving the FRMAC.

AP12.2.4. FRMAC Form 4: Daily Instrument QC Checks Form. This form is used to record QC information for each instrument at the beginning and the end of every shift.

AP12.2.5. FRMAC Form 5: Data Acquisition Log. This log and/or form is used by the Data Acquisition Officer to record field monitoring data reported by Monitoring and Sampling Teams.

AP12.2.6. FRMAC Form 6: Local Area Monitoring (LAM) TLDs Form. This form is used to record information on the deployment and retrieval of environmental TLDs, called LAMs.

AP12.2.7. FRMAC Form 7: Personnel TLD Data Sheet. This form is used to record deployment and retrieval information for personnel TLDs.

AP12.3. INSTRUCTIONS FOR FRMAC FORM 1: FIELD MONITORING LOG

AP12.3.1. The FRMAC FORM 1: Field Monitoring Log (see figure AP12.F1.) is completed for a series of measurements. This form is intended for legal size paper (8.5" x 14").

AP12.3.2. Before leaving the FRMAC, complete Team Number (1), Monitors' Names, and Date.

AP12.3.3. Form Fields

AP12.3.3.1. (1) Team Number. Number designated by Field Team Supervisor.

AP12.3.3.2. (2) Time of Measurement. Military time. Time zone is FRMAC time.

AP12.3.3.3. (3) Location. Survey location; street address, town, highway, farm, sector, distance, etc.

AP12.3.3.4. (4) Latitude. In degrees, minutes, and decimal minutes.

AP12.3.3.5. (5) Longitude. In degrees, minutes, and decimal minutes.

AP12.3.3.6. (6) Instrument ID. Number located on day glow sticker.

AP12.3.3.7. (7) Measurement. Data acquired through measurements.

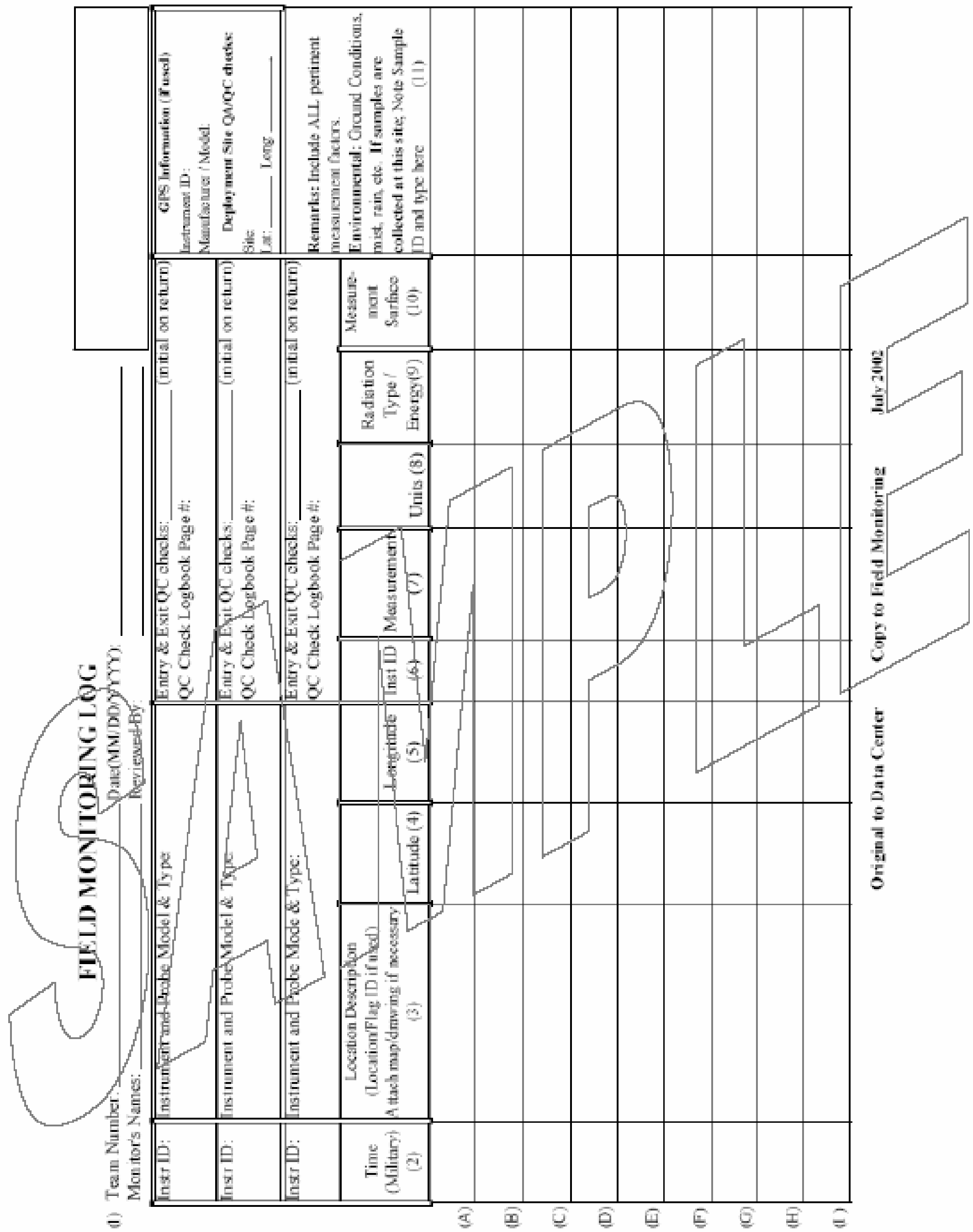
AP12.3.3.8. (8) Units. Units in which the instrument reads; CPM, DPM, $\mu Ci/m^2$, Microroentgen (μR)/hr, mR/hr, etc.

AP12.3.3.9. (9) Radiation Type/Energy. α, β/γ, X-ray, neutron, 60 keV γ, Am-241, etc.

AP12.3.3.10. (10) Measurement Surface. Examples include filter, soil, grass, etc.

AP12.3.3.11. (11) Remarks. Any factors pertinent to instrument measurements and any other environmental conditions. Also include information about samples taken at this site.

Figure AP12.F1. FRMAC Form 1: Field Monitoring Log



FIELD MONITORING LOG

(1) Team Number: ______ Date(MM/DD/YYYY): ______
Monitor's Names: ______ Reviewed By: ______

Instr ID:	Instrument and Probe Model & Type:	Entry & Exit QC checks: ______ (initial on return) QC Check Logbook Page #:	**GPS Information (if used)** Instrument ID: Manufacturer / Model: **Deployment Site QA/QC checks:** Site: Lat: ______ Long ______
Instr ID:	Instrument and Probe Model & Type:	Entry & Exit QC checks: ______ (initial on return) QC Check Logbook Page #:	
Instr ID:	Instrument and Probe Mode & Type:	Entry & Exit QC checks: ______ (initial on return) QC Check Logbook Page #:	

	Time (Military) (2)	Location Description (Location/Flag ID if used) Attach map/drawing if necessary (3)	Latitude (4)	Longitude (5)	Inst ID (6)	Measurement (7)	Units (8)	Radiation Type / Energy(9)	Measurement Surface (10)	**Remarks:** Include ALL pertinent measurement factors. **Environmental:** Ground Conditions, mist, rain, etc. **If samples are collected at this site;** Note Sample ID and type here (11)
(A)										
(B)										
(C)										
(D)										
(E)										
(F)										
(G)										
(H)										
(I)										

Original to Data Center **Copy to Field Monitoring** **July 2002**

AP12.4. INSTRUCTIONS FOR FRMAC FORM 2: SAMPLE CONTROL FORM

The FRMAC Form 2: Sample Control Form (see figure AP12.F2.) is used to document appropriate information as a sample is collected by a Monitoring and Sampling team. One form accompanies each sample to the Sample Receiving Line and from there to the Radioanalysis Laboratory. USE ONLY ONE FORM FOR EACH SAMPLE.

AP12.4.1. Top Part. Appropriate sampling team, sample location, and sample type information.

AP12.4.2. Remarks Section. Information that does not fit in any blank above or any additional pertinent information.

AP12.4.3. Shaded Part. For use by Sample Control and Radioanalysis Laboratory.

AP12.4.4. Chain of Custody. Fill in this part of the form every time custody of the sample is changed.

Figure AP12.F2. FRMAC Form 2: Sample Control Form

SAMPLE CONTROL FORM & CHAIN OF CUSTODY | *"Sample Control Barcode"*

Sampling Information (*to be filled out by the Field Team*)

Collection Team ID: Collector's Name: Org:

Location: ☐ GPS Latitude: ____________ Description: ____________

Longitude: ____________

Collection Date: Collection Time (Military): # of Containers Contact Dose Rate:

Remarks: ____________

Sample Type (use only once)

Air	Sampler ID #	Type:	Filter size & Type:	
	Date ON:	Time ON:	Date OFF:	Time OFF:
	Start Flow:	Stop Flow:	OR Total Volume:	Unit:
Milk	☐ Cow ☐ Goat ☐ Other ____	☐ Stored Feed	☐ Pasture	☐ Other ____
	Milking Date:	Milking Time:	Number of Animals sampled:	
Ground	Depth of soil sample: cm	Vegetation collected with soil samples?	☐ Yes ☐ No	
	Sample surface area:	If vegetation in separate container, provide sample #:		
Water	☐ Surface	☐ Ground / Well	☐ Portable / Tap	☐ Other:
Other	☐ Vegetation ☐ Feed	☐ Produce	☐ Swipe	☐ Other:
	Describe:			

Sample Receiving (*to be filled out by sample receiving technician*)

Processing Priority: Dup Sample #: Split Sample #:

Screening Value: ☐ **Contamination Check:** Forms and sample bags surveyed.

Sample Remarks:

Analysis Requested: ☐ **Sample Preparation Required**, send to sample preparation area before laboratory

Laboratory Assignment:

Special Instructions:

Custody Transfer (Signatures)

Relinquished By:	Date	Time	Received By:	Date	Time
Relinquished By:	Date	Time	Received By:	Date	Time
Relinquished By:	Date	Time	Received By:	Date	Time
Relinquished By:	Date	Time	Received By:	Date	Time

Original with Sample **Copy to Data Center** **Copy to Courier** **September 2002**

AP12.5. INSTRUCTIONS FOR FRMAC FORM 3: TEAM, INSTRUMENT, AND EQUIPMENT INFORMATION LOG

The FRMAC Form 3: Team, Instrument, And Equipment Information Log (see figure AP12.F3.) is completed and submitted to the Field Team Supervisor before leaving the FRMAC.

AP12.5.1. Top Part. Complete with team member information.

AP12.5.2. Bottom Part. Complete with instrument and equipment information, including license information of vehicle(s).

Figure AP12.F3. FRMAC Form 3: Team, Instrument, and Equipment Information Log

TEAM, INSTRUMENT, &
EQUIPMENT INFORMATION LOG

Field Team Supervisor Initials ____________________

Team Number			
Today's Date		Start Time	
Team Leader (Last, First, M.I.)			
Team Leader Organization			

TEAM MEMBERS

	Name (Last, First, Middle Initials)	Organization
1		
2		
3		
4		
5		

INSTRUMENT AND EQUIPMENT INFORMATION

Instrument / Equipment Number	Instrument / Equipment Type	Instrument / Equipment Number	Instrument / Equipment Type

Cellular Phone		Radio Number
Serial Number	Phone Number	

VEHICLE INFORMATION

License Plate Number	State	License Plate Number	State

This form must be completed and turned in to the Field Team Supervisor prior to field deployment

Original to Date Center **Yellow copy to Field Monitoring Division** September 2002

AP12.6. INSTRUCTIONS FOR FRMAC FORM 4: DAILY INSTRUMENT QC CHECKS FORM

The FRMAC Form 4: Daily Instrument QC Checks Form (see figure AP12.F4.) is used to record QC information for each instrument at the beginning and end of every shift.

AP12.6.1. Team #. Write team number.

AP12.6.2. Event. Write name of event.

AP12.6.3. Instrument Number. Write instrument number from day glow sticker.

AP12.6.4. Instrument Type. Write instrument type from day glow sticker.

AP12.6.5. Depart Date/Time. Record departure date and time using military notation
Example: 02 Sep 1997 1745

AP12.6.6. QC Check Source Type. Write the type of check source used (Am-241, background, Pu-238, etc.).

AP12.6.7. Check Source ID #. Include number of check source, if available.

AP12.6.8. Check Source Activity. Record activity of source and units. If instrument has different scales, record scale used.

AP12.6.9. Acceptable Operating Range. Write acceptable range of operation.

AP12.6.10. Depart Actual Reading. Record actual meter reading (Reading x Scale) at time of departure.

AP12.6.11. Return Date/Time. Record return date and time following the example in paragraph AP12.6.5., above.

AP12.6.12. Return Actual Reading. Record actual meter reading (Reading x Scale) on return.

Figure AP12.F4. <u>FRMAC Form 4: Daily Instrument QC Checks Form</u>

DAILY INSTRUMENT QC CHECKS

Event ____________ Team # ____________

Performed By ____________ Reviewed By ____________ Page _____ of _____

Instrument Number	Instrument Type	Depart Date/Time DDMMMYYYY 0000 (Military)	QC Check Source Type	Check Source ID #	Check Source Activity	Acceptable Operating Range	Depart Actual Reading	Return Date/Time DDMMMYYYY 0000 (Military)	Return Actual Reading

September 2002

AP12.7. INSTRUCTIONS FOR THE FRMAC FORM 5: DATA ACQUISITION LOG

The FRMAC Form 5: Data Acquisition Log (see figure AP12.F5.) is used by the Data Acquisition Officer to record field monitoring data reported by Monitoring and Sampling teams. Columns on the Data Acquisition Log correspond to those on the Field Monitoring Log. Therefore, report data in the order recorded on the Field Monitoring Log.

AP12.7.1. (1) Team #. Number of Monitoring and Sampling team reporting data.

AP12.7.2. (2) Time of Day. In military time. Time zone is FRMAC time.

AP12.7.3. (3) Location. Description of survey; i.e., street address, town, highway, sector, distance, if applicable.

AP12.7.4. (4) Latitude. In degrees, minutes, and decimal minutes.

AP12.7.5. (5) Longitude. In degrees, minutes, and decimal minutes.

AP12.7.6. (6) Instrument ID. Number located on day glow sticker.

AP12.7.7. (7) Measurement. Data acquired through measurements.

AP12.7.8. (8) Units. Units in which instrument reads.

AP12.7.9. (9) Radiation Type/Energy. Type of radiation/energy measured.

AP12.7.10. (10) Measurement Surface. Examples: grass, soil, filter, etc.

AP12.7.11. (11) Remarks. For any factors pertinent to instrument measurements, and any other environmental conditions.

Figure AP12.F5. FRMAC Form 5: Data Acquisition Log

DATA ACQUISITION LOG

Page ____ of ____

Date ____

Event ____

Data Acquisition Officer ____

Data Entry Operator ____

Reviewed By ____

Entry #	Team # (1)	Time (military) (2)	Location Description (3)	Latitude (4)	Longi-tude (5)	Inst ID (6)	Measure-ment (7)	Units (8)	Radiation Type /Energy (9)	Measure-ment Surface (10)	Remarks If samples are collected at this site; Note Sample ID and type here (11)

Original to Data Center **Copy to Field Monitoring** September 2002

AP12.8. INSTRUCTIONS FOR THE **FRMAC FORM 6:** LAM TLDs FORM

The FRMAC Form 6: LAM TLDs Form (see figure AP12.F6.) is used to record information on the deployment and retrieval of environmental TLDs, called LAMs.

AP12.8.1. Top Part. Enter information when LAMs are deployed and again when they are retrieved.

AP12.8.2. Under Station, record:

AP12.8.2.1. #. The number of the station.

AP12.8.2.2. Description. Location information.

AP12.8.2.3. Latitude and Longitude. Latitude and longitude of the station.

AP12.8.3. Under TLDs, record:

AP12.8.3.1. Number 1. Record the number of one of the LAMs.

AP12.8.3.2. Number 2. Record the number of the other LAM.

AP12.8.3.3. Deployed and Retrieved

AP12.8.3.3.1. Date and initial when the LAMs are deployed.

AP12.8.3.3.2. Date and initial when the LAMs are retrieved.

AP12.8.4. Under Remarks, include any additional, pertinent information.

AP12.8.5. Chain of Custody. To be signed when relinquishing LAMs.

Figure AP12.F6. <u>FRMAC Form 6: LAM TLDs Form</u>

LOCAL AREA MONITORING (LAM) TLDs

STATION				TLDs				Remarks
#	Description	Latitude	Longitude	Number 1	Number 2	Deployed Date/Time Initials	Retrieved Date/Time Initials	

CHAIN OF CUSTODY			DATE
Relinquished By:	Received By:		
Relinquished By:	Received By:		
Deployment Transit Control TLD Numbers	1)	2)	
Retrieval Transit Control TLD Numbers	1)	2)	
FOR LABORATORY USE ONLY			
FRMAC-to-Laboratory Transit Control TLD Numbers			

Original to Data Center **Yellow Copy to Field Monitoring** **Pink Copy to Laboratory** September 2002

AP12.9. <u>INSTRUCTIONS FOR THE FRMAC FORM 7: PERSONNEL TLD DATA SHEET</u>

The FRMAC Form 7: Personnel TLD Data Sheet (see figure AP12.F7.) is used to record deployment and retrieval information for personnel TLDs.

AP12.9.1. <u>Top Part</u>. Complete as TLDs are assigned.

AP12.9.2. <u>TLD #</u>. Record number.

AP12.9.3. <u>Location and Deployed Information</u>. Record “N.A.” (not applicable) if person is mobile rather than at one location. Collected Complete when TLD is retrieved.

AP12.9.4. <u>Remarks</u>. Any additional information pertinent to TLD, location, or any other environmental information.

AP12.9.5. <u>Names and Addresses</u>. Include names of all persons at one location receiving TLDs.

AP12.9.6. <u>Chain of Custody</u>. To be signed when relinquishing TLD.

Figure AP12.F7. FRMAC Form 7: Personnel TLD Data Sheet

PERSONNEL TLD DATA SHEET

Privacy Act Statement: *The information on this form is protected by the Privacy Act of 1974. The purpose of requesting this information is to conduct dose tracking. This information will be used by the U.S. Department of Energy, Nevada Operations Office, its contractors, and the home organization of the participant. Failure to provide this information will result in not receiving a dose assessment or proper dose tracking.*

Personnel TLD Data Sheet

Personnel TLD Data Sheet #
40134

Event	TLD #	Latitude	Longitude	Deployed		Retrieved	
				Date/Time (Military)	Initials	Date/Time (Military)	Initials
Location Describtion:							

Name	Last	First	Middle

Mailing Address	City	State	Zip Code

Phone Number (with area code)	Social Security Number *	Date of Birth	Sex
			M F

Remarks (Issue/Retrieval): ______

CHAIN OF CUSTODY

Relinquished By:	Date/Time (Military)	Received By:	Date/Time (Military)	Transit Numbers:
Relinquished By:	Date/Time (Military)	Received By:	Date/Time (Military)	Transit Numbers:
Relinquished By:	Date/Time (Military)	Received By:	Date/Time (Military)	Transit Numbers:
Relinquished By:	Date/Time (Military)	Received By:	Date/Time (Military)	Transit Numbers:

Revision Date July 1998

* SSN Disclaimer: The Health and Safety Group requires that Social Security number information be provided. This information is held in strict confidence; it is not released.

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Appendix A - 19 May 2001 DOE/NV/11718--440

AP13. APPENDIX 13

CONVERSION FACTORS FOR WEAPONS GRADE PLUTONIUM

AP13.1. ASSUMPTIONS

AP13.1.1. Conversions are for weapons grade plutonium only, with no americium.

AP13.1.2. Density of soil 1.5 g/cm^3.

AP13.1.3. Specific activity (alpha only) 0.075 Ci/g.

AP13.1.4. Contamination of soil is to the depth of 1 cm.

AP13.2. CONVERSION TABLES

Tables AP13.T1. through AP13.T7. provide a variety of conversion factors for weapons grade plutonium.

Table AP13.T1. Conversion Factors for Weapons Grade Plutonium

To Convert	Into	Multiply by
µCi/m^2	µg/m^2	13
µCi/m^2	dpm/m^2	2.2 x 10^{-6}
µCi/m^2	dpm/cm^2	220
µCi/m^2	dpm/g	150
µCi/m^2	µCi/g	6.7 x 10^{-5}
µCi/m^2	pCi/g	67
µg/m^2	µCi/m^2	0.075
µg/m^2	dpm/m^2	1.7 x 10^{5}
µg/m^2	dpm/cm^2	17
µg/m^2	dpm/g	11
µg/m^2	µCi/g	5 x 10^{-6}
µg/m^2	pCi/g	5
dpm/m^2	µCi/m^2	4.5 x 10^{-7}
dpm/m^2	µg/m^2	6.1 x 10^{-6}
dpm/m^2	dpm/cm^2	10^{-4}
dpm/m^2	dpm/g	6.7 x 10^{-5}
dpm/m^2	µCi/g	3.0 x 10^{-11}
dpm/m^2	µCi/g	3.0 x 10^{-5}
dpm/cm^2	µCi/m^2	4.5 x 10^{-3}
dpm/cm^2	µg/m	6.l x 10^{-2}

Table AP13.T1. Conversion Factors for Weapons Grade Plutonium, continued

To Convert	Into	Multiply by
dpm/cm^2	dpm/m^2	10^4
dpm/cm^2	dpm/g	0.67
dpm/cm^2	µCi/g	3.0×10^{-7}
dpm/cm^2	pCi/g	0.3
dpm/g	$\mu Ci/m^2$	6.8×10^3
dpm/g	$\mu g/m^2$	0.091
dpm/g	dpm/m^2	1.5×10^4
dpm/g	dpm/cm^2	1.5
dpm/g	µCi/g	4.5×10^{-7}
dpm/g	pCi/g	0.45
µCi/g	$\mu Ci/m^2$	1.5×10^4
µCi/g	$\mu g/m^2$	2×10^5
µCi/g	dpm/m^2	3.3×10^{10}
µCi/g	dpm/cm^2	3.3×10^6
µCi/g	dpm/g	2.2×10^6
µCi/g	pCi/g	10^6
pCi/g	$\mu Ci/m^2$	1.5×10^{-2}
pCi/g	$\mu g/m^2$	0.20
pCi/g	dpm/m^2	3.3×10^4
pCi/g	dpm/cm^2	3.3
pCi/g	dpm/g	2.2
pCi/g	µCi/g	10^{-6}
µ units	units	10^{-6}
units	µ units	10^6

AP13.2.1. The conversion of alpha instrument readings in CPM into quantifiable units is affected by the type of surface and meter efficiency. For accurate conversions, a surface sample from the area measured should be analyzed with laboratory equipment and the conversion factor for that area computed. Table AP13.T2., below, provides approximate factors for converting alpha readings in CPM into $\mu g/m^2$ for various surfaces using the equation: $\mu g/m^2$ - correction factor x CPM

Table AP13.T2. Approximate Factors for Converting Alpha Readings for Various Surface Types

Type of Surface	Correction Factor
Soil	.006
Concrete	.005
Plywood	.004
Stainless Steel	.0025

AP13.2.2. The correction factors consider unit and area conversions, nominal instrument efficiency during field use, and assume a 60-sq-cm probe area (AN/PDR-60 or PAC-1S). Correction factors should be multiplied by four for use with the AN/PDR-56. Tables AP13.T3. and AP13.T4. were prepared from the table AP13.T1. and the equation in paragraph AP13.2.1. for users of the AN/PDR-56 and AN/PDR-60, respectively.

Table AP13.T3. Conversion Table (CPM to µg/m^2 or µCi/m^2) AN/PDR-56 Alpha Meter

CPM	**SOIL**		**CONCRETE**		**PLYWOOD**		**STAINLESS STEEL**	
AN/ PDR-56	**µg/m^2 Pu-239**	**µCi/m^2 Pu-239**	**µg/m^2 Pu-239**	**µCi/m^2 Pu-239**	**µg/m^2 Pu-239**	**µCi/m^2 Pu-239**	**µg/m^2 Pu-239**	**µCi/m^2 Pu-239**
50	1.2	.09	1.0	.075	.8	.06	.5	.038
100	2.4	.18	2.0	.15	1.6	.12	1.0	.075
200	4.8	.36	4.0	.30	3.2	.24	2.0	.15
400	9.6	.72	8.0	.60	6.4	.48	4.0	.30
600	14.4	1.08	12.0	.90	9.6	.72	6.0	.45
800	19.2	1.44	16.0	1.20	12.8	.96	8.0	.60
1,000	24.0	1.80	20.0	1.50	16.0	1.20	10.0	.75
1,200	28.8	2.16	24.0	1.80	19.2	1.44	12.0	.90
1,500	36.0	2.70	30.0	2.25	24.0	1.80	15.0	1.13
2,000	43.2	3.24	36.0	2.70	28.8	2.16	18.0	1.35
2,200	52.8	3.96	44.0	3.30	35.2	2.64	22.0	1.65
2,500	60.0	4.50	50.0	3.75	40.0	3.00	25.0	1.88
2,800	67.2	5.04	56.0	4.20	44.8	3.36	28.0	2.10
3,000	72.0	5.40	60.0	4.50	48.0	3.60	30.0	2.25
4,000	96.0	7.20	80.0	6.00	64.0	4.80	40.0	3.00
5,000	120.0	9.00	100.0	7.50	80.0	6.00	50.0	3.75
8,000	192.0	14.40	160.0	12.00	128.0	9.60	80.00	6.00
10,000	240.0	18.00	200.0	15.00	160.0	12.00	100.0	7.50
11,000	264.0	19.80	220.0	16.50	176.0	13.20	110.0	8.25
12,000	288.0	21.60	240.0	18.00	192.0	14.40	120.0	9.00
25,000	600.0	45.00	500.0	37.50	400.0	30.00	250.0	18.75
50,000	1,200.0	90.00	1,000.0	75.00	800.0	60.00	500.0	37.50

Table AP13.T3. Conversion Table (CPM to µg/m^2 or µCi/m^2) AN/PDR-56 Alpha Meter, continued

75,000	1,800.0	135.00	1,500.0	112.50	1,200.0	90.00	750.0	56.25
100,000	2,400.0	180.00	2,000.0	150.00	1,600.0	120.00	1,000.0	75.00
150,000	3,600.0	270.00	3,000.0	225.00	2,400.0	180.00	1,500.0	112.50
200,000	4,800.0	360.00	4,000.0	300.00	3,200.0	240.00	2,000.0	150.00
300,000	7,200.0	540.00	6,000.0	450.00	4,800.0	360.00	3,000.0	225.00

*To convert µCi/m^2 to Bq/m^2, multiply by 3.7×10^4.

Table AP13.T4. Conversion Table (CPM to µg/m^2 or µCi/m^2) AN/PDR-60

CPM	**SOIL**		**CONCRETE**		**PLYWOOD**		**STAINLESS STEEL**	
AN/PDR-60	**µg/m^2 Pu-239**	**µCi/m^2 Pu-239**	**µg/m^2 Pu-239**	**µCi/m^2 Pu-239**	**µg/m^2 Pu-239**	**µCi/m^2 Pu-239**	**µg/m^2 Pu-239**	**µCi/m^2 Pu-239**
50	0.3	.023	.25	.019	.2	.015	.125	.009
100	0.6	.045	.50	.38	.4	.03	.25	.019
200	1.2	.09	1.0	.075	.8	.06	.5	.038
400	2.4	.18	2.0	.15	1.6	.12	1.0	.075
600	3.6	.27	3.0	.23	2.4	.18	1.5	.113
800	4.8	.36	4.0	.30	3.2	.24	2.0	.15
1,000	6.0	.45	5.0	.38	4.0	.30	2.5	.19
1,200	7.2	.54	6.0	.45	4.8	.36	3.0	.23
1,500	9.0	.68	7.5	.56	6.0	.45	3.8	.28
1,800	10.8	.81	9.0	.68	7.2	.54	4.5	.34
2,200	13.2	.99	11.0	.83	8.8	.66	5.5	.41
2,500	15.0	1.13	12.5	.94	10.0	.75	6.3	.47
2,800	16.8	1.26	14.0	1.05	11.2	.84	7.0	.53
3,000	18.0	1.35	15.0	1.13	12.0	.90	7.5	.56
4,000	24.0	1.80	20.0	1.50	16.0	1.20	10.0	.75
5,000	30.0	2.25	25.0	1.88	20.0	1.50	12.5	.94
8,000	48.0	3.60	40.0	3.00	32.0	2.40	20.0	1.50
10,000	60.0	4.50	50.0	3.75	40.0	3.00	25.0	1.88
11,000	66.0	4.95	55.0	4.13	44.0	3.30	27.5	2.06
12,000	72.0	5.40	60.0	4.50	48.0	3.60	30.0	2.25
25,000	150.0	11.25	125.0	9.38	100.0	7.50	62.5	4.69
50,000	300.0	22.50	250.0	18.75	200.0	15.00	125.0	9.38
75,000	450.0	33.75	375.0	28.13	300.0	22.50	187.5	14.06
100,000	600.0	45.00	500.0	37.50	400.0	30.00	250.0	18.75
150,000	900.0	67.50	750.0	56.25	600.0	45.00	375.0	28.13
200,000	1,200.0	90.00	1,000.0	75.00	800.0	60.00	500.0	37.50
300,000	1,800.0	135.00	1,500.0	112.50	1,200.0	90.00	750.0	56.25

*To convert µCi/m^2 to Bq/m^2, multiply by 3.7×10^4.

Table AP13.T5. Conversion Table (CPM to μg/m^2 or μCi/m^2) ADM-300

CPM	Soil		Concrete		Plywood		Stainless Steel	
ADM - 300	**μg/m^2**	**μCi/m^2**	**μg/m^2**	**μCi/m^2**	**μg/m^2**	**μCi/m^2**	**μg/m^2**	**μCi/m^2**
	Pu-239	**Pu-239**	**Pu-239**	**Pu-239**	**Pu-239**	**Pu-239**	**Pu-239**	**Pu-239**
50	0.19	0.01	0.16	0.01	0.13	0.01	0.08	0.006
100	0.39	0.03	0.33	0.02	0.26	0.02	0.16	0.012
200	0.78	0.06	0.66	0.05	0.52	0.04	0.32	0.024
400	1.56	0.12	1.32	0.10	1.04	0.08	0.64	0.048
600	2.34	0.18	1.98	0.15	1.56	0.12	0.96	0.072
800	3.12	0.23	2.64	0.20	2.08	0.16	1.28	0.096
1,000	3.90	0.29	3.30	0.25	2.60	0.19	1.60	0.12
1,200	4.68	0.35	3.96	0.30	3.12	0.23	1.92	0.14
1,500	5.85	0.44	4.95	0.37	3.90	0.29	2.40	0.18
1,800	7.02	0.53	5.94	0.45	4.68	0.35	2.88	0.22
2,200	8.58	0.64	7.26	0.55	5.72	0.43	3.52	0.26
2,500	9.75	0.73	8.25	0.62	6.50	0.49	4.00	0.30
2,800	10.9	0.82	9.24	0.69	7.28	0.55	4.48	0.34
3,000	11.7	0.88	9.90	0.74	7.80	0.58	4.80	0.36
4,000	15.6	1.17	13.2	0.99	10.4	0.78	6.40	0.48
5,000	19.5	1.46	16.5	1.24	13.0	0.97	8.00	0.60
8,000	31.2	2.34	26.4	1.98	20.8	1.56	12.8	0.96
10,000	39.0	2.93	33.0	2.47	26.0	1.95	16.0	1.20
12,000	46.8	3.51	39.6	2.97	31.2	2.34	19.2	1.44
20,000	78.0	5.85	66.0	4.95	52.0	3.90	32.0	2.40
25,000	97.5	7.31	82.5	6.19	65.0	4.87	40.0	3.00
50,000	195.0	14.62	165.0	12.37	130.0	9.75	80.0	6.00
75,000	292.5	21.94	247.5	18.56	195.0	14.62	120.0	9.00
100,000	390.0	29.25	330.0	24.75	260.0	19.50	160.0	12.0
150,000	585.0	43.87	495.0	37.12	390.0	29.25	240.0	18.0
200,000	780.0	58.50	660.0	49.50	520.0	39.00	320.0	24.0
300,000	1170.0	87.75	990.0	74.25	780.0	58.50	480.0	36.0

Table AP13.T6. Conversion Table (Megabequerel (MBq) to Millicuries (mCi) and Microcuries µCi)

MBq	**mCi**	**MBq**	**µCi**
7,000	189.	30	810
6,000	162.	20	540
5,000	135.	10	270
4,000	108.	9	240
3,000	81.	8	220
2,000	54.	7	189
1,000	27.	6	162
900	24.	5	135
800	21.6	4	108
700	18.9	3	81
600	16.2	2	54
500	13.5	1	27
400	10.8	0.9	24
300	8.1	0.8	21.6
200	5.4	0.7	18.9
100	2.7	0.6	16.2
90	2.4	0.5	13.5
80	2.16	0.4	10.8
70	1.89	0.3	8.1
60	1.62	0.2	5.4
50	1.35	0.1	2.7
40	1.08		

Table AP13.T7. Conversion to International System Units

1 Ci = 3.7×10^{10} Bq
1 Bq = 2.7×10^{-11} Ci

1 RAD = 10^{-2} Gy
1 Gy = 100 RADs

1 REM = 10^{-2} Sv
1 Sv = 100 REM

SI Units:
Becquerels (Bq)
Sieverts (Sv)
gray (Gy)

AP14. APPENDIX 14

NON-RADIOLOGICAL TOXIC HAZARDS

AP14.1. GENERAL

Several weapon-specific non-radiological hazards may be present because of a nuclear weapon accident. Some of those hazards are mentioned in this appendix.

AP14.2. PURPOSE

This appendix provides information useful in implementing training programs for medical personnel responding to nuclear weapon accidents.

AP14.3. NON-RADIOLOGICAL TOXIC HAZARDS

The DOT's Emergency Response Guidebook (reference (bs)) is a source document for hazardous response, evacuation, hazard descriptions, and protective actions for non-radiological HAZMATs. Reference (bs) was developed jointly by the U.S. DOT, Transport Canada, and the Secretariat of Communications and Transportation of Mexico for use by firefighters, police, and other emergency services personnel who may be the first to arrive at the scene of a transportation accident involving a HAZMAT. It is mainly a guide to aid first responders in quickly identifying the specific or generic classification of the material(s) involved in the event, and protecting themselves and the general public during this initial response phase of the accident.

AP14.3.1. Beryllium

AP14.3.1.1. Beryllium is a light, gray-white nonradioactive metal that is hard and brittle and resembles magnesium.

AP14.3.1.2. Hazards and Health Considerations. In its solid state (normal state), beryllium is not a personnel hazard. However, in powder, oxide, or gaseous form, it is extremely dangerous. Inhalation is the most significant means of entry into the body. Because it oxidizes easily, any fire or explosion involving beryllium liberates toxic fumes and smoke. When beryllium enters the body through cuts, scratches, or abrasions on the skin, ulceration often occurs. One of the peculiarities of beryllium poisoning is that no specific symptoms are apparent. The most common symptom is an acute or delayed type of pulmonary edema or berylliosis. Other commonly occurring signs and symptoms are ulceration and irritation of the skin, shortness of breath, chronic cough, cyanosis, loss of weight, and extreme nervousness. Another hazard of beryllium is its interference with wound healing. A wound contaminated with traces of beryllium does not heal until the metal is removed. Beryllium or its compounds, when in finely divided form, should never be handled with the bare hands but always with rubber gloves. An M40-series, or equivalent protective mask and/or respirator, and personal protective

clothing must be worn in an area known, or suspected, to be contaminated with beryllium dust. An SCBA is necessary when beryllium fumes or smoke are present. Decontamination of personnel, terrain, or facilities shall be similar to radiological decontamination. An effective method, when applicable, is vacuum cleaning, using a cleaner with a HEPA filter. Since beryllium is not radioactive, its detection requires chemical analysis in a properly equipped laboratory. Direct detection in the field is impossible.

AP14.3.2. Lithium

AP14.3.2.1. Lithium and its compounds, usually lithium hydride, may be present at a nuclear weapon accident. Due to its highly reactive nature, naturally occurring lithium is always found chemically with other elements. When exposed to water, a violent chemical reaction occurs, producing heat, hydrogen, oxygen, and lithium hydroxide. The heat causes the hydrogen to burn explosively, producing a great deal of damage.

AP14.3.2.2. Hazards and Health Considerations. Lithium may react directly with the water in the body tissue causing severe chemical burns. Also, lithium hydroxide is a caustic agent that affects the body, especially the eyes, in the same manner as lye (sodium or potassium hydroxide). Respiratory protection and firefighter clothing are required to protect personnel exposed to fires involving lithium or lithium hydrides. An SCBA is necessary if fumes from burning lithium components are present. The eyes and skin must be protected for operations involving these materials.

AP14.3.3. Lead. Pure lead and most of its compounds are toxic. Lead enters the body through inhalation, ingestion, or skin absorption. Inhaling lead compounds presents a very serious hazard. Skin absorption is usually negligible, since the readily absorbed compounds are seldom encountered in sufficient concentration to cause damage. Once inside the body, lead concentrates in the kidneys and bones. From the bone deposits, lead is slowly liberated into the bloodstream causing anemia and resulting in a chronic toxic condition. Lead poisoning displays several specific characteristics and symptoms. The skin of an exposed individual turns yellowish and dry. Digestion is impaired with severe colicky pains, and constipation results. With a high body burden, the exposed individual has a sweet, metallic taste in his mouth and a dark blue coloring of the gums from a deposition of black lead sulfide. Lead concentrations within the body have been reduced successfully by using chelating agents. An M17 or equivalent protective mask protects personnel against inhalation of lead compounds.

AP14.3.4. Plastics. When involved in a fire, all plastics present varying degrees of toxic hazards due to the gases, fumes, and/or minute particles produced. The gaseous or particulate products may produce dizziness and prostration initially, mild and severe dermatitis, severe illness, or death if inhaled, ingested, placed in contact with the skin, or absorbed through the skin. Any fire involving plastics that are not known to be harmless should be approached on the assumption that toxic fumes and particles are present. This includes all nuclear weapon fires.

AP14.3.5. HE. Information on pressed and cast HE and IHE shall be extracted from reference (z), after a DOE/NNSA classification review.

AP14.3.6. Hydrazine. Hydrazine is used as a missile fuel or as a fuel in some aircraft emergency power units. Hydrazine is a colorless, oily fuming liquid with a slight ammonia odor. It is a powerful explosive that, when heated to decomposition, emits highly toxic nitrogen compounds and may explode by heat or chemical reaction. Self-igniting when absorbed on earth, wood, or cloth, the fuel burns when a spark produces combustion; any contact with an oxidized substance such as rust may also cause combustion. When hydrazine is mixed with equal parts of water, it does not burn; however it is toxic when inhaled, absorbed through the skin, or taken internally. Causing skin sensitization as well as systemic poisoning, hydrazine may damage the liver or destroy red blood cells. The permissible exposure level is 0.l parts per million, although a lower concentration causes nasal irritation. After exposure to hydrazine vapors or liquids, remove clothing immediately and spray exposed area with water for 15 minutes. An SCBA is required in vapor and/or liquid concentrations.

AP14.3.7. Red Fuming Nitric Acid. Red nitric acid is an oxidizer for some missile propellant systems. It is a reddish brown, highly toxic corrosive liquid with a sharp, irritating, pungent odor. Dangerous when heated to decomposition, it emits highly toxic fumes of nitrogen oxides and reacts with water or steam to produce heat and toxic corrosive and flammable vapors. The permissible exposure level is two parts per million, although a lower concentration causes nasal irritation and severe irritation to the skin, eyes, and mucous membranes. Immediately after exposure, wash acid from skin with copious amounts of water. An SCBA is required in vapor and/or liquid concentrations.

AP14.3.8. Solid Fuel Rocket Motors. Rocket motors (composed of dymeryl dissocyanate, cured hydroxyl terminated polybutadine polymer, ammonium perchlorate, and aluminum powder or other cyanate, butadiene, perchlorate, or nitrate-based compounds) present severe explosive hazards if accidentally ignited. If rocket motors ignite or catch fire, evacuate to a safe distance.

AP14.3.9. Composite Fibers (CFs). CFs are carbon, boron, and graphite fibers that are milled into composite epoxy packages that are integral aircraft structural members. If the epoxy outer layer breaks or catches fire, CF strands may be emitted into the environment and become a respiratory tract, eye, and skin irritation hazard. In the immediate accident area or location where a composite package has broken open, the fibers may cause severe arcing and shorting of electrical equipment. For additional information, refer to AFMAN 32-4004 (reference (bt)).

AP14.3.10. JP-10. JP-10 is used as a missile fuel. It is a clear liquid and has a kerosene-like odor. Recommended special firefighting procedures are to use a water spray to cool fire-exposed surfaces and to protect personnel. Wear an SCBA when firefighting in confined spaces. JP-10 is an aspiration hazard. It is slightly toxic by inhalation. Do not allow liquid or mist to enter lungs. Vapor contact causes very little to no eye irritation. High heat, sparks, open flame, or strong oxidizers may ignite JP-10 fuel.

AP14.3.11. TH Dimer. Similar to JP-10, TH Dimer is also a missile fuel with the same color and odor characteristics. The hazards and firefighting precautions are also similar. TH Dimer may cause gastrointestinal irritation (vomiting and diarrhea) and nausea. For prolonged and/or repeated skin contact, appropriate impervious clothing is required (gloves, boots, pants, coat, face protection, etc.).

AP14.3.12. Composite Materials. Composite materials are solids that are composed of two or more substances having different physical characteristics. Such materials might be at the site of a nuclear weapon accident and pose additional health and safety hazards if involved in a fire or explosion. Composite materials are broken down into three categories:

AP14.3.12.1. Composite. A physical combination of two or more materials, i.e., fiberglass (glass fiber and epoxy).

AP14.3.12.2. Advance Composite. A material composed of high strength and/or high stiffness fibers (reinforcement) with a resin (matrix). Examples include Graphite/Epoxy, Kevlar®/Epoxy, and Spectra/Cyanate Ester.

AP14.3.12.3. Advance Aerospace Material. A highly specialized material used to fulfill unique aerospace construction, environment, and/or performance requirements. Examples include Beryllium, DU, and Radar Absorbent Materials.

AP15. APPENDIX 15

JIC/CIB ADMINISTRATIVE, COMMUNICATION, AND LOGISTIC SUPPORT AND/OR EQUIPMENT

Administrative, communications, and logistics support and/or equipment recommended to support an established JIC/CIB include:

AP15.1.1. Personal computers, for both classified and unclassified computing, to include laptop systems with CD ROM and CD Read/Write capabilities. Ideally, unclassified computers shall provide access to the Internet, a response force intranet, and e-mail. Classified computing capabilities with SECRET Internet Protocol Router Network access and a STU-III phone for secure communications are highly desirable.

AP15.1.2. Portable television satellite antennas.

AP15.1.3. Printers and ink cartridges.

AP15.1.4. Software and blank discs.

AP15.1.5. Photocopier machine(s) and access to printing.

AP15.1.6. Copy paper.

AP15.1.7. Furniture to support multiple work areas.

AP15.1.8. Visual information, audiovisual, and sound reinforcement equipment.

AP15.1.9. Graphics capability and/or support.

AP15.1.10. Professional quality multi-system still digital and video cameras, video recorders, and playback systems (film, developing equipment, and digital electronic imaging equipment).

AP15.1.11. Overhead projectors and transparencies.

AP15.1.12. Laptop projection capabilities and screen.

AP15.1.13. Appropriate directional and/or information signs.

AP15.1.14. Voice recorders and battery chargers.

AP15.1.15. AM-FM radios.

AP15.1.16. Blank audio and videotapes, or blank digital formats.

AP15.1.17. Office supplies.

AP15.1.18. Maps.

AP15.1.19. Briefing aids, including easels, mixers, and microphones.

AP15.1.20. News sources including televisions and radio receivers (portable, battery operated); wire services; newspapers; magazines; and electronic bulletin boards, news banks, and databases.

AP15.1.21. Position locators and/or navigational equipment.

AP15.1.22. Power converters (110 and 220 volt).

AP15.1.23. Extension cords, plug adapters, and power strips.

AP15.1.24. Various types of batteries.

AP15.1.25. Mobile radios.

AP15.1.26. Cellular phones.

AP15.1.27. Answering machines.

AP15.1.28. Pagers.

AP15.1.29. Facsimile machines.

AP15.1.30. Support vehicles (for public affairs staff and media pools and/or escort).

AP15.1.31. Satellite communications.

AP16. APPENDIX 16

JIC/CIB RECOMMENDED KEY MESSAGES AND NON-RELEASABLE INFORMATION

AP16.1. JIC/CIB RECOMMENDED KEY MESSAGES

Local emergency response officials are responsible for public safety. OSC release of information to those officials must not be confused with release of information to the general public. It is crucial to publicly confirm a nuclear weapons accident and confirm radioactive contamination (if true) as soon as this information is received and confirmed. Delay may lead to public speculation (response forces show up in personal protective suits), panic, and loss of credibility. Delay may also cause members of the public to be unnecessarily exposed to low levels of radiation that may be released during the accident. Paragraphs AP16.1.1. through AP16.1.5., below, list key messages recommended for use during the initial phase.

AP16.1.1. Safety

AP16.1.1.1. Public safety is our first priority.

AP16.1.1.2. Trained military and civilian personnel are responding.

AP16.1.1.3. Please stay away from the cordon so that we may work without interference.

AP16.1.1.4. Preventing any further injuries or loss of life is paramount.

AP16.1.1.5. Please continue to listen to local TV and radio and/or refer to response web site for further advice.

AP16.1.2. Sympathy

AP16.1.2.1. We deeply regret this accident has occurred.

AP16.1.2.2. Our thoughts and condolences go out to families and friends of those involved.

AP16.1.3. Cooperation

AP16.1.3.1. We are working closely with all involved military and civilian organizations.

AP16.1.3.2. We are working together as a team.

AP16.1.3.3. Hundreds of trained military and civilian personnel are responding.

AP16.1.3.4. We are bringing our best people and the most advanced equipment to deal with this emergency.

AP16.1.4. Disclosure

AP16.1.4.1. We are here to coordinate the initial response.

AP16.1.4.2. We shall give you information as soon as it becomes available.

AP16.1.4.3. We want to answer your questions.

AP16.1.4.4. We do not have all the answers.

AP16.1.5. Compensation

AP16.1.5.1. There shall be an investigation.

AP16.1.5.2. Procedures shall be established to handle requests for compensation.

AP16.2. JIC/CIB NON-RELEASABLE INFORMATION

The JIC/CIB must ensure the media and public understand early on that there is some information that is not expected to be released by the OSC or the JIC/CIB.

AP16.2.1. Political

AP16.2.1.1. U.S. and/or host nation diplomatic efforts.

AP16.2.1.2. Foreign relations.

AP16.2.1.3. NATO information.

AP16.2.1.4. Comments about other nations' nuclear weapons.

AP16.2.2. Policy

AP16.2.2.1. Future nuclear program and/or posture.

AP16.2.2.2. Deterrence.

AP16.2.2.3. Legality of nuclear weapons and their use.

AP16.2.2.4. Nuclear disarmament.

AP16.2.2.5. U.S. nuclear weapons overseas.

AP16.2.2.6. Accident investigation arrangements.

AP16.2.2.7. Details of government-to-government agreements and/or arrangements.

AP16.2.3. <u>Operational</u>

AP16.2.3.1. Nuclear weapon C2 arrangements.

AP16.2.3.2. Location of nuclear weapons (excluding those involved in the accident).

AP16.2.3.3. Transportation of nuclear weapons (frequency of flights and routes).

AP16.2.3.4. Specific weapon design, characteristics, and/or modifications.

AP16.2.3.5. Weapon recovery plans (routes, packaging, and containerization).

AP16.2.3.6. Cost estimates for cleanup and/or remediation.

AP17. APPENDIX 17

PUBLIC AFFAIRS GUIDANCE AND/OR CONTINGENCY RELEASES

AP17.1. CONTINGENCY RELEASES

Figures AP17.F1. through AP17.F5., below, show templates for contingency releases.

Figure AP17.F1. Contingency Release Number 1

CONTINGENCY RELEASE NUMBER 1

To the General Public

"When the Public Is Probably in Danger"
(Does confirm)

(Format of sample release to be used when a nuclear accident occurs. Public safety considerations require this announcement because of the likelihood of fire or conventional high-explosive detonation of the weapon. The following statement should be made locally or by appropriate higher authority if no local authority is available.)

An aircraft (other type of transportation) accident occurred (or other circumstances) about (location and time). The accident involved a nuclear weapon that contains conventional explosives and radioactive material. There is no danger of a nuclear detonation, but there is a danger from the conventional explosives that (are burning, may detonate, have detonated). The public is requested to stay out of (indicate the area) (under surveillance by guards) in the interest of safety and to avoid hampering operations at the accident scene. An experienced response team has been ordered to the scene.

(If appropriate, the following SHALL be included in the release.) Radioactive material in the form of dust may be scattered because of the accident. The dust poses little risk to health unless taken into the body by breathing or swallowing, although it is unlikely that any person might inhale or swallow an amount that should cause illness. As a precautionary measure, you are asked to stay calm and indoors. Turn off fans, air conditioners, and forced-air heating units that bring in fresh air from the outside. Use them only to recirculate air already in the building. Eat and drink only canned or packaged foods that have been inside. If you must go outside, cover your nose and mouth and avoid stirring up and breathing any dust. It is important to remember that your movement might cause yourself greater exposure to any radioactive dust, should it be present, and you might possibly spread contamination to others.

(If plutonium is involved) One of the materials involved is plutonium, which is both a toxic and a radiation hazard and a chemical poison if ingested. The radiation given off consists of alpha particles that do not have sufficient energy to penetrate buildings, clothing, or even the outer

Figure AP17.F1. Contingency Release Number 1, continued

skin. Therefore, short-term exposure to contamination outside the body poses a negligible health risk. The precautions mentioned earlier should be carefully followed to prevent ingestion.

(If uranium is involved) One of the materials involved is uranium. Uranium, depending on the type, may be a radiological hazard or a chemical health hazard, similar to lead poisoning. Uranium gives off alpha particles that do not penetrate skin and pose no health risk when outside the body.

The public is asked to stay out of the area (under surveillance or closed off by guards) (and if true) until a monitoring team, now en route to the accident site, may survey the ground and determine the exact area affected by the accident. Any fragments found near the scene may be contaminated and should be left in place. If fragments have been picked up, avoid further handling and notify (authorities) for proper retrieval and disposition.

Periodic announcements shall be made as more information is known. It is expected that these precautionary actions shall be modified as more information becomes available. A U.S. (Military Service) team from (name of installation) is en route to (has arrived at) the accident scene.

We have no details yet on civilian or military casualties (or give number only of civilian and military casualties) or property damage.

The cause of the accident is under investigation. Further details shall be provided as they become available.

Figure AP17.F2. <u>Contingency Release Number 2</u>

<u>CONTINGENCY RELEASE NUMBER 2</u>

To notify the general public

"<u>No Radiological Danger to the Public</u>"

(Confirms to reduce public alarm)

(Format of sample release to be used initially when no danger to the public from contamination or blast exists, but when confirming the presence or absence of a nuclear weapon or nuclear components significantly prevents or reduces widespread public alarm that may result from unusual activity at the accident and/or incident site.)

A U.S. (type) aircraft (other type of transportation) carrying HAZMAT, classified cargo, or unarmed nuclear weapon(s) crashed (or other circumstances) at about (location and time).

The public is requested to stay out of the area (add, if true: under surveillance by guards) to prevent any remote possibility of hazard from the accident (or conventional HE detonation) and to avoid hampering removal operations. There is no need for evacuation. (There is no danger of nuclear detonation.)

The cause of the accident is under investigation. Further details shall be provided as they become available.

Figure AP17.F3. <u>Contingency Release Number 3</u>

<u>CONTINGENCY RELEASE NUMBER 3</u>

To notify the general public

"<u>When the Public Is Possibly in Danger</u>"

(Confirms possibility of contamination in a nuclear weapon accident)

(Format of sample release to be used when nuclear weapons or nuclear components have been involved in an accident and the possibility exists for contamination due to fire or explosion, and details are unknown. The release to the general public should only be used after the area has been secured. Release may be modified as shown below depending on audience.)

<u>MINIMUM ANNOUNCEMENT</u>

A U.S. (type) aircraft (other type of transportation) carrying unarmed nuclear weapons or nuclear components crashed (or other circumstances) at (location) at about (time).

Figure AP17.F3. Contingency Release Number 3, continued

The public is asked to stay out of the accident area in the interest of safety due to the possibility of hazard from the accident (or conventional HE detonation) and to avoid hampering recovery operations. (There is no danger of nuclear detonation.)

ADD THE FOLLOWING FOR APPROPRIATE OFFICIALS

Fire, rescue, and other emergency services personnel should approach the area with caution from upwind and be equipped with protective clothing and breathing apparatus. Any local official at the scene of the accident or who has left the site who may provide details on the situation should call this number (________________). Current information from the accident scene shall help response personnel respond to the accident and provide additional public safety guidance. If contact with the accident scene is established, determine the following: condition of aircraft and/or vehicle (such as burning, evidence of explosion, or extent of damage); condition of accident site (such as fire or blast damage); or evidence of obvious cargo (such as shapes or containers). Avoid handling any debris at the crash site.

If the aircraft is transporting nuclear weapons containing IHE or weapons overpacked with accident-resistant containers, detonation is much less likely, and the fire should be fought as long as there is a reasonable expectation of saving lives or containing the fire. The weapons, or containers, if exposed, should be cooled with water.

Law enforcement officials should prevent unauthorized personnel from entering the site and picking up fragments of the plane (vehicle) or its cargo. If any fragments have already been picked up, avoid further contact or handling. Notify (authorities) for retrieval and proper disposition.

A U.S. (Military Department) team from (name of installation) is en route to (has arrived at) the accident scene.

We have no details yet on civilian or military casualties or property damage.

The cause of the accident is under investigation. Further details shall be provided as they become available.

Figure AP17.F4. Contingency Release Number 4-A

CONTINGENCY RELEASE NUMBER 4-A

"To Notify State and Local Officials
When the Public Is Possibly in Danger"
(Neither confirms nor denies)

(Format of sample release to be used if public safety considerations require notifying State and local officials that hazardous cargo has been involved in an accident, the possibility exists for contamination due to fire or explosion, and details are unknown.)

MINIMUM ANNOUNCEMENT

A U.S. (type) aircraft (other type of transportation) carrying HAZMAT crashed (or other circumstances) about (location) at (time).

Visitors are warned to stay out of the area of the accident in the interest of public safety. Fire, rescue, and other emergency services personnel should approach the area with caution from upwind and be equipped with protective clothing and breathing apparatus. Water should not be directly used on the aircraft unless needed to save property or lives. Any local official at the scene of the accident who may provide details on the situation should make a telephone call to this number (local phone). Current information from the accident scene helps evaluate the accident and provide additional public safety guidance. If contact with the accident scene is established, determine the following: condition of aircraft (burning, evidence of explosion, extent of damage, etc.); condition of accident site (fire, blast, or damage); evidence of obvious cargo (shapes or containers). Determine the need for a public announcement of nuclear weapons involvement based on the responses to the above.

EXPANDED ANNOUNCEMENT

If there is no immediate threat to life, and the fire may not be extinguished immediately (five minutes), the fire should be contained and allowed to burn out. Water as a firefighting agent should be used with caution due to possible adverse reaction with materials involved in the fire.

Law enforcement officials should prevent unauthorized personnel from entering the site and picking up fragments of the plane (vehicle) or its cargo. If any fragments have been picked up already, avoid further contact or handling. Notify (authorities) for retrieval and proper disposition.

Military personnel have been dispatched (shall be dispatched) and shall arrive (are scheduled to arrive) soon at the site.

Figure AP17.F5. Contingency Release Number 4-B

CONTINGENCY RELEASE NUMBER 4-B

To Notify the General Public
"When the Public Is Possibly in Danger"
(Neither confirms nor denies)

(Format of sample release to be used if public safety considerations require making a PUBLIC RELEASE that hazardous cargo was involved in an accident, the possibility exists for contamination due to fire or explosion, and details are unknown.)

A U.S. (type) aircraft (other type of transportation) carrying HAZMAT crashed (or other circumstances) about (location) at (time). The public is warned to stay out of the area (under surveillance by guards) in the interest of safety and to aid operations at the accident scene.

A U.S. (Military Service) team from (name of installation) is en route to (has arrived at) the scene of the accident.

We have no details yet on civilian or military injuries or property damage.

Further announcements shall be made as more information is known.

AP17.2. IN RESPONSE TO QUERY ONLY

AP17.2.1. In response to the question, "Are nuclear weapons stored at (name of facility) or (name of facility)?" The official reply is, "It is DoD policy neither to confirm nor deny the presence of nuclear weapons at any particular location."

AP17.2.2. In response to the question, "Are nuclear weapons aboard a specific surface ship, attack submarine, or naval aircraft?" The official reply is, "It is general U.S. policy not to deploy nuclear weapons aboard surface ships, attack submarines, and naval aircraft. However, we do not discuss the presence or absence of nuclear weapons aboard specific ships, submarines, or aircraft."

AP18. APPENDIX 18

PUBLIC AFFAIRS RADIATION FACT SHEETS

Figures AP18.F1. through AP18.F5. show standard public affairs radiation fact sheets.

Figure AP18.F1. Fact Sheet 1: Characteristics, Hazards, and Health Considerations of Plutonium

FACT SHEET 1

CHARACTERISTICS, HAZARDS, AND HEALTH CONSIDERATIONS OF PLUTONIUM

(For release to the general public)

The accident at ________(to be filled in)______ has resulted in the release of the radioactive substance plutonium. Persons who are downwind from the accident may become exposed to this substance by coming into contact with contamination (radioactive material that has coated or fallen on the surfaces of structures, the ground, or objects) from the mishap. Also, very small amounts of plutonium may have been spread by the winds to adjacent areas. Radiological survey teams are monitoring these suspected areas to determine the presence of plutonium and to measure the levels, if present. No immediate danger exists to anyone, and no medical intervention is necessary; however, some actions may help prevent further contamination or reduce its spread to clean areas.

Plutonium, which is abbreviated Pu, is a heavy metal that has a shiny appearance, similar to stainless steel when freshly machined. After exposure to the atmosphere for any period of time, it oxidizes to a dark brown or black appearance. When released from a weapons accident, plutonium may not be readily seen by the naked eye, but in areas close to the accident, its presence may be assumed in dust and dirt on the ground or on flat surfaces, and from ash resulting from the accident fire.

Plutonium is an alpha radiation emitter; that is, it radiologically decays by emitting an alpha particle, a very heavy radioactive particle. Alpha particles do not substantially penetrate materials. Their range in air is only a few inches at most. This means that alpha radiation is not a hazard to people if it stays external to the body. The epidermis, or outer dead layer of the skin, is sufficient protection for exposure to this isotope from sources external to the body. No external hazard exists to people walking through an area contaminated with plutonium. Alpha radiation may, however, represent an internal radiation hazard when plutonium is taken into the body by inhaling contaminated air, eating contaminated food, or getting contamination into a wound or cut. In actuality, contamination from ingestion is unlikely to be a problem, since plutonium is very poorly absorbed through the intestines. Less than 0.02 percent may be absorbed, or 2 of every 10,000 atoms eaten. Absorption through wounds may introduce small amounts of plutonium into the body. Inhaling plutonium particles is the most likely route of internal exposure.

Figure AP18.F1. Fact Sheet 1: Characteristics, Hazards, and Health Considerations of Plutonium, continued

Inhaled plutonium is kept in the lungs in much the same manner that people in a dust storm inhale dust. This "dust" settles in the lungs. Once in the lungs, a low percentage of plutonium may be translocated by the bloodstream to the liver and the bones. This deposition may be prevented by using "chelation" compounds, such as ethylenediamine tetraacetic acid or diethylenetriamine pentaacetic acid (DTPA), which hasten the excretion of plutonium from the body through the urine. The use of these chelating compounds is not without some medical hazard to the individual, since they are IV-administered, and should be performed by a physician who has been in contact with appropriate agencies to coordinate the use of these drugs.

Plutonium in a weapon has a radiological half-life (the length of time it takes for the plutonium to lose one half of its radioactivity) of more than 24,000 years. This long half-life means that its radioactivity does not decrease substantially by nuclear decay or disintegration. Likewise, eliminating plutonium from the body is also a very slow process. Biological elimination of plutonium may be improved significantly by using the chelating agents mentioned above.

Therefore, until the limits of contamination are determined, the public is advised to follow a few simple guidelines to reduce the spread of contamination, and there shall be little, if any, hazard. Stay inside and reduce opening doors and windows. Turn off fans, air-conditioners, and forced air heating units that bring in fresh air from the outside. Use them only to recirculate air already in the building. Children should not play outdoors. Fruits and vegetables grown in the area should not be eaten. Individuals who think they have inhaled some plutonium should not be unduly concerned. The inhalation of plutonium is not an immediate medical emergency. Very sensitive monitoring equipment is being brought into this area to survey the inhabitants of suspected contamination area(s) for inhaled radiation, and once established, this shall be made available to those who need it.

Figure AP18.F2. Fact Sheet 2: Medical Department Fact Sheet on Plutonium

FACT SHEET 2

MEDICAL DEPARTMENT FACT SHEET ON PLUTONIUM

(For Medical Personnel)

Plutonium is a highly reactive element that may exhibit five oxidation states, from three to seven. The principal routes into the body are through inhalation and contaminated wounds; ingestion and contaminated intact skin are unimportant.

Inhalation is probably the most significant route of contamination in a nuclear weapons accident. Retention in the lungs depends on particle size and the chemical form of plutonium involved. Usually, in a weapons accident, plutonium is in the form of an oxide that has a pulmonary retention half-time of up to 1,000 days.

Absorption through wound contamination results in a translocation of some of the material to the skeleton and liver. The majority remains in the vicinity of the wound and may result in the formation of a fibrous nodule within months to years. The possible development of a sarcoma or carcinoma in such nodules is a matter of concern, although there have been no reports of such in the medical literature.

After entry into the body, some of the plutonium is solubilized by the body fluids, including blood, and is redistributed within the body. Ultimately, it is distributed by the blood to the skeleton (45 percent), liver (45 percent), and the other tissues (10 percent). The retention half-times are estimated to be 200 years (whole body), 100 years (skeleton), and 40 years (liver).

All medical treatment for plutonium contamination or inhalation should be coordinated with the appropriate Service Medical Department or with the REAC/TS because of the hazard of the substances involved. DTPA compounds are defined as investigational drugs that require the advice and concurrence of the REAC/TS before administration. The REAC/TS may be contacted at: (423) 576-3131.

Treatment of plutonium contaminated wounds should involve copious washing and irrigation to try to dislodge the contamination. If possible, washings should be saved for later counting to determine contamination levels. More extensive treatment by excision requires judgment in assessing the area involved, the difficulty of excision, and the total quantity in the wound. Greater than 4 mCi of Pu embedded in a wound should be considered a candidate for such treatment. It is not expected that the physician shall need to make this determination, since a specialized team to perform such monitoring may be made available from the OSC or his or her representative. Immediate chelation therapy with DTPA (consult the REAC/TS for protocol) should be accomplished before surgical excision to prevent possible systemic absorption of plutonium. In burn cases, flushing with sterile saline or water removes a great deal of contamination. The remainder is likely to be removed when the eschar sloughs off.

Figure AP18.F2. Fact Sheet 2: Medical Department Fact Sheet on Plutonium, continued

DTPA treatment given immediately after wound or burn treatment has been shown to remove up to 96 percent of the remaining plutonium. In the case of inhaled plutonium, the results have been relatively disappointing, since the oxide forms of plutonium are transferred at a relatively slow rate from the lungs into the systemic circulation. Thus, little systemic burden of plutonium is available for chelation in the early period after exposure and there is never a time when a sizable systemic burden is available in the extracellular spaces for effective chelation.

In spite of this, DTPA should be used as soon as possible after significant inhalation exposures, since the oxides may not be the only compound present. Attempts to stimulate phagocytosis and the mucociliary response, or to use expectorant drugs, have not been successful in animal studies; however, this may not be true in humans.

The only demonstrated useful procedure in enchasing the clearance of insoluble particles, such as plutonium oxides, from the lung is bronchopulmonary lavage. The risk of this procedure versus the risk of future health effects from the estimated lung burden must be very carefully weighed. The use of repeated lavages should remove 25 to 50 percent of the plutonium that should otherwise be kept in the lung. Again, advice should be sought from the Service medical command and the REAC/TS.

Figure AP18.F3. Fact Sheet 3: Plutonium Fact Sheet

FACT SHEET 3

PLUTONIUM FACT SHEET

(For Operational Commanders)

As Operational Commander, you shall be assaulted by many needs at once in determining the actions to be taken in coping with a nuclear weapons accident. You should have had the opportunity to review the preceding fact sheets for the general public and medical personnel. Several facts are important to keep in mind, as general guidance.

By the time you have arrived at the scene, the weapons have usually suffered low order detonations if they are going to do so. This low order detonation produces a cloud of finely dispersed plutonium that falls out over the area downwind, depending on particle size, wind direction and speed, and amount of explosives in the detonation. A very worst case situation is shown on the ARAC plots that are made available to you. The initial ARAC plots show the detonation of all weapons involved, using all the available explosives. The actual scenario should be less, perhaps 10 to 100 times less, based on the actual survey data from the site. Note that plots are predictive in nature, and must be corroborated by actual field measurements.

The cloud deposits its radioactive material within minutes of the accident. Unless it happens on base, or you are at the scene, there is little you may do to prevent inhalation from the cloud passage. After initial cloud passage, the inhalation of material from the accident is by resuspending the plutonium by operations in the area of cloud passage, such as walking. The DOE may compute a dose equivalent for persons in the area of the initial cloud passage. People exposed in the plume may experience significant intakes of radioactive material through inhalation (with corresponding significant radiation doses). Note that this is only from the cloud passage; doses from resuspension shall be significantly less.

The important point is that the ARAC plot usually overestimates the total dispersion of plutonium, and the dose estimate is based only on cloud passage, not later resuspension of the plutonium; therefore, basing your sheltering plans on these numbers may easily result in a significant conservatism.

Sheltering should be recommended for the downwind population, but you must be careful to avoid the impression of extreme hazard from the plutonium. Your sheltering advisory should indicate that there is a contamination hazard and a slight inhalation hazard. Care should be taken not to increase tension over the accident and/or incident. You and your PAO should stress that people should stay indoors as much as possible, keep houses closed to prevent contamination, and follow other ideas, as outlined in the public release.

Usually, the resuspension of plutonium in the original areas of contamination is not significant, except for the area very close to the accident site. To prevent the spread of material in this area, consider spraying with some sort of fixative to prevent resuspension and/or spread of the

Figure AP18.F3. Fact Sheet 3: Plutonium Fact Sheet, continued

plutonium. Something as simple as hand sprayers with vegetable oil may be used to bind the plutonium into the soil and/or surface around the site. A secondary advantage is that this method lowers the airborne hazard for the workers inside the control boundaries and may help the eventual cleanup process move faster. It does, however, mask the plutonium from some alpha detection RADIACs, such as the AN/PDR 56. Usually, these types of instruments are used only for monitoring people or material leaving the site, not site contamination surveys.

In dealing with a nuclear weapons accident, some of the concepts that are usually used to handle injuries and/or fatalities on board ship do not hold true, or may be counterproductive. Such an example is keeping the population under tight sheltering requirements or restricting traffic from the contamination area downwind. Any recommendation for the civilian populace shall be just that, a recommendation. The military has no authority in the contamination areas unless they are military areas, or are within the NDA. Use the local authorities, and have the FEMA representative assist in this function.

Some concept of the exact magnitude of the risk people experience from the accident may be compared with the risks outlined in the Nuclear Regulatory Guide 8.29 (reference (bu)). The Service, DOE, and/or NNSA health physicists should be consulted to give the best approximation of the public risk; this may be compared with the risks reference (bu).

Figure AP18.F4. Fact Sheet 4: Characteristics, Hazards, and Health Considerations of Uranium

FACT SHEET 4

CHARACTERISTICS, HAZARDS, AND HEALTH CONSIDERATIONS OF URANIUM

(For Operational Commanders)

Some nuclear weapons may contain uranium. Uranium is a mild to moderately radioactive material that may be hazardous if inhaled in large quantities. In a nuclear weapons accident, the uranium in the warhead of the weapon may get dispersed into the air by fire or explosion of the HE in the weapon. (Keep in mind that this is not a nuclear detonation.) The heat and smoke from the fire or explosion may carry small particles of uranium into the air. As the smoke plume travels downwind, the particles of uranium begin to settle to the ground, leaving a track of contamination on the ground surface and vegetation. Larger particles settle out first, smaller particles may travel much further. The highest levels of uranium contamination shall be in the immediate area of the accident. In general, the further away from the accident, the lower the levels of uranium contamination that may be expected.

Uranium is a heavy metal, somewhat like lead. Uranium is a naturally occurring mineral that is mildly radioactive. As found in nature, uranium consists mostly of the isotope U-238, with small quantities of U-235 and extremely small quantities of U-234. This so-called “natural uranium” is only mildly radioactive, emitting alpha and beta radiation and low levels of gamma radiation. The half-life of U-238, the major constituent of natural uranium, is 4.5 billion years. It is likely that uranium released in the circumstances of a weapons accident is in the chemical form of uranium oxide.

Uranium may be “enriched,” that is, the concentration of U-235 may be increased, by many methods. Commercial nuclear reactors use uranium that has been enriched so that the U-235 makes about 5 percent of the total uranium mass (the rest is U-238.) Some nuclear weapons use highly enriched uranium (HEU) in which the U-235 makes up more than 90 percent of the total mass of uranium. The uranium left over from the enrichment process is called “depleted” uranium because it has only about one-third as much U-235 as natural uranium. Nuclear weapons may contain several types of uranium, from depleted to highly enriched.

Uranium may be a mild to moderate radiation hazard if it is inhaled. Uranium is not particularly hazardous if it stays outside the body. If uranium is inhaled, the lungs and other organs of the body may receive doses of radiation; however, a person must inhale a very large quantity of uranium to get a significant dose of radiation. Even if the uranium was involved in a fire or explosion, it is unlikely that anyone would get a serious radiation dose from inhalation. It is much more likely that dispersal of uranium should create more of a “nuisance” contamination problem.

Compared to plutonium (the major HAZMAT in many nuclear weapons), uranium is not very hazardous. In a nuclear weapons accident in which both plutonium and uranium have been dispersed, the hazard from plutonium is far more serious than that from uranium. Although

Figure AP18.F4. Fact Sheet 4: Characteristics, Hazards, and Health Considerations of Uranium, continued

uranium emits alpha radiation (that may result in internal radiation doses if taken into the body) very much like plutonium, pound-for-pound, uranium is from 1,000 to 100,000 times less radioactive than plutonium. A person would have to inhale roughly 1,000 to 100,000 times as much uranium mass to get the same dose as they would from plutonium. In addition, uranium does not stay in the body as long as plutonium; therefore, the radiation dose received by the organs is somewhat lower.

Depleted and natural uranium is at least 100 times less radioactive than HEU. It is unlikely that accidents involving dispersal of depleted or natural uranium shall result in any significant radiation doses. HEU contamination presents more of a problem than depleted or natural uranium, but is still far less of a problem than plutonium contamination.

If a person is directly exposed to a smoke plume from a fire or explosion involving uranium, he or she may have been exposed to significant levels of airborne uranium. If he or she is in areas where the ground was contaminated, he or she may have been exposed to a much lower level of uranium that was re-suspended into the air. If a person thinks he or she may have been exposed to uranium (as described above) he or she should contact the appropriate Federal or State authorities and let them know. The authorities shall arrange for appropriate radiation detection tests to be made. These tests may include collecting urine samples and/or scheduling for a “lung count” examination. Depending on the chemical form of the uranium that has been inhaled, some part of the uranium in the body is excreted in the urine. Urine samples may be analyzed for the presence of uranium. (All people have a low concentration of uranium in their urine from the trace quantities of uranium in the normal diet.) Lung count is a procedure performed by placing very sensitive radiation detectors near a person’s chest to look for low energy X-rays emitted by the uranium mixture. Typically, the person reclines on a table or in a chair while the detectors are placed near the chest wall. A lung count is not like an X-ray exam. A lung count is a completely passive exam; the detectors do not emit any radiation, and the person does not receive any radiation dose from the exam. A “quick” screening lung scan may be performed in about 10 or 15 minutes. A more sensitive exam performed at a special “whole body counting” facility typically takes about 45 to 50 minutes.

In general, uranium is more hazardous to children than adults, due to the smaller size and different metabolism of children. To assure that children are adequately protected, PAGs established by the EPA take this increased sensitivity into account.

If uranium stays outside of the body, it is not particularly hazardous. The beta and gamma radiation emitted by uranium is relatively weak, and uranium emits only low levels of this radiation. The intensity of these gamma rays is so low that the measurable radiation field from uranium only extends a few feet away from solid uranium metal. Even high levels of uranium contamination on the ground do not produce any significant external radiation hazards.

Figure AP18.F5. Fact Sheet 5: Characteristics, Hazards, and Health Considerations of Tritium

FACT SHEET 5

CHARACTERISTICS, HAZARDS, AND
HEALTH CONSIDERATIONS OF TRITIUM

(For Operational Commanders)

Some nuclear weapons have small metal bottles that contain tritium, a radioactive gas. In an accident involving nuclear weapons, it is possible that these gas bottle systems may be damaged, and that some or all of the tritium gas is released into the air. Tritium gas that is released into the air is quickly diluted and dispersed, and is not likely to be a significant hazard, unless there was a fire or explosion at the accident, and then it should only be a hazard to people in the immediate area of the accident.

Tritium is a radioactive form of the element hydrogen. From a chemical standpoint, tritium atoms behave just like hydrogen atoms. Tritium is often stored and used in the form of a gas. Like hydrogen, tritium combines readily with many other elements. For example, a tritium atom may take the place of a hydrogen atom in a water molecule, to form what is called "tritiated water," sometimes called tritium-oxide or "HTO."

Some tritium is produced naturally, by the interaction of cosmic rays in the earth's atmosphere. These cosmic ray interactions produce about 4 million Ci of tritium every year worldwide. This tritium is incorporated into rainwater, resulting in a low, but measurable "background," level of tritium in almost all water. The concentration of tritium in surface water is typically on the order of 10 to 50 picocuries per liter.

Tritium is also produced in nuclear reactors. This manufactured tritium may be separated and purified for a variety of uses. There is no difference between manufactured tritium and tritium that is produced naturally. Tritium is used in nuclear weapons, fusion research, luminous signs and watches, and in biomedical research.

Tritium gas is relatively harmless, since very little of it is absorbed into the body, even if inhaled; however, if there were a fire or explosion at the same time as the tritium was released, some or all of the tritium gas should probably be converted into HTO. When people are exposed to HTO in the air, some of it is inhaled, and some of it may be absorbed through the skin.

The radiation doses that might be received from exposure to the smoke plume decrease rapidly with distance away from the accident. People who were directly exposed to the smoke plume, very close to the accident site (within a few hundred yards) might receive radiation doses greater than the occupational limit of 5 REM. Beyond a few hundred yards, doses should be well below a few REM. Beyond about 1/2 mile, the dose to a person who was directly in the smoke plume is likely to be less than the dose a person receives every year from natural background radiation.

Figure AP18.F5. Fact Sheet 5: Characteristics, Hazards, and Health Considerations of Tritium, continued

Tritium is relatively easy to detect with appropriate instruments. Tritium on surfaces may be detected by rubbing a small piece of filter paper over the surface, and then “counting” the radioactivity on the paper (which is placed in a small vial) in an instrument called a “liquid scintillation counter.” Tritium in water or other liquid may be counted by placing a sample of the liquid in a small vial and then counting the vial in the liquid scintillation counter. Tritium in the air may be measured by sampling the air with a “flow-through ionization chamber” instrument, which gives a real time reading of the concentration of tritium in air.

The form of tritium that is most likely to get inside the body is HTO in the form of water vapor (in the air.) Airborne tritium (as HTO vapor) may be inhaled, and may also be absorbed through the skin. When people are exposed to HTO vapor, about 2/3 of the total intake comes from inhalation of the tritium, and about 1/3 comes from absorption of the tritium through the skin. Tritium may also be incorporated into crops, which then may be ingested.

Once tritium is inside the body, it behaves just like water and is distributed rapidly and uniformly throughout the entire volume of body water, where it may deliver a radiation dose to the soft tissues of the entire body. Tritium is eliminated from the body at the same rate and through the same pathway as water is eliminated from the body, excretion of urine and feces, sweat, and loss through exhalation.

The amount of time required for half of the tritium remaining in the body to be removed from the body is called the “biological half life.” Since tritium in the body behaves just like water, and since the body’s water is continually eliminated and replaced, the biological half life of tritium is very short – about 10 days.

AP19. APPENDIX 19

PUBLIC AFFAIRS CHECK LIST

The Public Affairs Checklist is listed in paragraphs AP19.1.1. through AP19.1.10.

AP19.1.1. Recommend the OSC confirms (nuclear weapons accident occurred and radiation contamination).

AP19.1.2. Communicate with the Office of the ASD(PA) and appropriate local and State pubic affairs personnel. In foreign territory, ensure communication with the theater PAO; the U.S. Embassy; and, as appropriate, foreign, local, national, and military public affairs personnel.

AP19.1.3. Ensure security review of, coordinate (legal, weapons, medical, radiological, and SR), and authorize release of information about U.S. nuclear weapon accident response.

AP19.1.4. Establish a JIC/CIB, an ICC, a media center, and a briefing area with local authorities, and in foreign territory, with the U.S. embassy and, as appropriate, with foreign, local, national, and military personnel.

AP19.1.5. Develop a public affairs plan with key messages.

AP19.1.6. Monitor news media reports and provide feedback to response organizations and higher HQ.

AP19.1.7. Establish an internal information program.

AP19.1.8. Establish and take part in a public outreach program.

AP19.1.9. Ensure adequate communications, transportation, logistic, computer and/or information system, and administrative support for public affairs response staff.

AP19.1.10. Ensure adequate transportation, communications, and logistic support for news media, as appropriate.

AP20. APPENDIX 20

PERTINENT STATUTES AND INSTRUCTIONS

AP20.1. AUTHORITY FOR RESPONSE TO ACCIDENT

AP20.1.1. Executive Order (E.O.) 12656 (reference (bv)).

AP20.1.2. White House Memorandum, "National System for Emergency Coordination" (reference (bw)).

AP20.1.3. Section 5121 of reference (h), "The Robert T. Stafford Disaster Relief and Emergency Assistance Act."

AP20.1.4. E.O. 12148 (reference(bx)).

AP20.1.5. E.O. 12241 (reference (by)).

AP20.1.6. Reference (e).

AP20.1.7. Reference (a).

AP20.1.8. Reference (p).

AP20.1.9. Reference (q).

AP20.1.10. DoD Directive 3150.5 (reference (bz))

AP20.1.11. Reference (x).

AP20.1.12. DoD Directive 5410.14 (reference (ca)).

AP20.1.13. Title 44, Code of Federal Regulations, Part 206 (reference (cb)).

AP20.1.14. Reference (d).

AP20.1.15. Chairman of the Joint Chiefs of Staff Instruction 3125.01 (reference (cc)).

AP20.2. AUTHORITY TO ESTABLISH RA TO PROTECT CLASSIFIED INFORMATION

AP20.2.1. Section 797 of reference (ap), "Security Regulations and Orders; Penalty for Violation."

AP20.2.2. Section 2271 of reference (h), "General Provisions."

AP20.2.3. Reference (w).

AP20.2.4. Reference (aw).

AP20.2.5. Reference (aq).

AP20.2.6. Reference (am).

AP20.2.7. DoD Directive 5210.63 (reference (cd).

AP20.3. <u>CRIMINAL STATUTES</u>

AP20.3.1. Section 111 of reference (ao), “Assaulting, Resisting, or Impeding Certain Officers or Employees.”

AP20.3.2. Section 231 of reference (ao), “Civil Disorders.”

AP20.3.3. Section 241 of reference (ao), “Conspiracy Against Rights.”

AP20.3.4. Section 245 of reference (ao), “Federally Protected Activities.”

AP20.3.5. Section 372 of reference (ao), “Conspiracy to Impede or Injure Officer.”

AP20.3.6. Section 641 of reference (ao), “Public Money, Property, or Records.”

AP20.3.7. Section 793 of reference (ao), “Gathering, Transmitting, or Losing Defense Information.”

AP20.3.8. Section 795 of reference (ao), “Photographing and Sketching Defense Installations.”

AP20.3.9. Section 796 of reference (ao), “Use of Aircraft for Photographing Defense Installations.”

AP20.3.10. Section 797 of reference (ao), “Publication and Sale of Photographs of Defense Installations.”

AP20.3.11. Section 1361 of reference (ao), “Government Property or Contracts.”

AP20.3.12. Section 1362 of reference (ao), “Communication Lines, Stations, or Systems.”

AP20.3.13. Section 1382 of reference (ao), “Entering Military, Naval, or Coast Guard Property.”

AP20.3.14. Section 2101 of reference (ao), "Riots."

AP20.3.15. Section 2231 of reference (ao), "Assault or Resistance."

AP20.3.16. Section 2381 of reference (ao), "Treason."

AP20.3.17. Section 2384 of reference (ao), "Seditious Conspiracy."

AP20.4. <u>AUTHORITY OF THE FBI</u>

AP20.4.1. Section 3052 of reference (ao), "Powers of Federal Bureau of Investigation."

AP20.4.2. Section 2271(b) of reference (h), "General Provisions."

AP20.5. <u>AUTHORITY FOR MILITARY ACQUISITION OF LAND AND JUST COMPENSATION FOR PROPERTY</u>

AP20.5.1. Section 2672a of title 10, U.S.C., "Acquisition: Interests in Land When Need Is Urgent" (reference (ce)).

AP20.5.2. Amendment V. U.S. Constitution (reference (cf)).

AP20.6. <u>AUTHORITY FOR PAYMENT OF CLAIMS</u>

AP20.6.1. Sections 2731-2738 of reference (ce), "Military Claims."

AP20.6.2. Section 2671 of title 28, U.S.C., "Administrative Adjustment of Claims" (reference (cg)).

AP 20.6.3. DoD Directive 5515.8 (reference (ch)).

AP20.7. <u>ENVIRONMENTAL AUTHORITIES</u>

AP20.7.1. Sections 4321-4370f of reference (h), "National Environmental Policy Act."

AP20.7.2. Sections 9601-9675 of reference (h), "Comprehensive Environmental Response, Compensation, and Liability Act of 1980."

AP20.7.3. E.O. 11514 (reference (ci)).

AP20.7.4. Sections 1251-1386 of title 33, U.S.C., "Federal Water Pollution Control Act" (reference (cj)).

AP20.7.5. Sections 1531-1544 of title 16, U.S.C., “Endangered Species Act” (reference (ck)).

AP20.7.6. Sections 2701-2761 of reference (cj), “Oil Pollution Act.”

AP20.7.7. Sections 7401-7671q of reference (h), “Clean Air Act.”

AP20.7.8. Sections 6901-6992K of reference (h), “Resource Conservation and Recovery Act.”

AP20.7.9. Title 40, Code of Federal Regulations, Part 300, “National Oil and Hazardous Substance Pollution Contingency Plan” (reference (cl)).

AP20.7.10. E.O. 12580 (reference (cm)).

AP20.7.11. DoD Directive 6050.7 (reference (cn)).

AP20.7.12. E.O. 12114 (reference (co)).

AP20.7.13. DoD Directive 5030.41 (reference (cp)).

AP20.7.14. DoD 4715.5-G (reference (cq)).

AP20.7.15. DoD Instruction 4715.5 (reference (cr)).

AP20.8. MISCELLANEOUS

AP20.8.1. Section 552 of reference (bd), as amended, “Freedom of Information Act.”

AP20.8.2. 552a of reference (bd), as amended, “Privacy Act.”

AP20.8.3. 552b of reference (bd), “Government in Sunshine Act.”

AP20.8.4. Sections 2671-2679 of reference (cg), “Federal Torts Claims Act.”

AP20.8.5. DoD Directive 5030.14 (reference (cs)).

AP20.8.6. DoD Directive 5030.50 (reference (ct)).

AP20.8.7. DoD Directive 2000.12 (reference (cu)).

AP20.8.8. DoD Instruction 2000.16 (reference (cv)).

AP20.8.9. DoD Directive 3020.36 (reference (cw)).

AP20.8.10. DoD Directive 5100.46 (reference (cx)).

AP20.8.11. DoD 5200.8-R (reference (cy)).

AP20.8.12. DoD Directive 5525.5 (reference (cz)).

AP20.8.13. Reference (w).

AP20.8.14. DoD Instruction 4000.19 (reference (da)).

AP20.8.15. DoD 3025.1-M (reference (db)).

AP20.9. <u>POSSE COMITATUS ACT, EXCEPTIONS TO THE POSSE COMITATUS ACT, AND RELATED STATUTES</u>

AP20.9.1. Section 1385 of reference (ao), "Use of Army and Air Force as Posse Comitatus."

AP20.9.2. Section 331 of reference (ce), "Federal Aid for State Governments."

AP20.9.3. Section 332 of reference (ce), "Use of Militia and Armed Forces to Enforce Federal Authority."

AP20.9.4. Section 333 of reference (ce), "Interference with State and Federal Law."

AP20.9.5. Section 371 of reference (ce), "Use of Information Collected During Military Operations."

AP20.9.6. Section 372 of reference (ce), "Use of Military Equipment and Facilities."

AP20.9.7. Section 373 of reference (ce), "Training and Advising Civilian Law Enforcement Officials."

AP20.9.8. Section 374 of reference (ce), "Maintenance and Operation of Equipment."

AP20.9.9. Section 375 of reference (ce), "Restriction on Direct Participation by Military Personnel."

AP20.9.10. Section 376 of reference (ce), "Support Not to Affect Adversely Military Preparedness."

AP20.9.11. Section 377 of reference (ce), "Reimbursement."

AP20.9.12. Section 382 of reference (ce), "Emergency Situations Involving Chemical or Biological Weapons of Mass Destruction."

AP20.9.13. Section 175 of reference (ao), "Prohibitions with Respect to Biological Weapons."

AP20.9.14. Section 831 of reference (ao), "Prohibited Transactions Involving Nuclear Materials."

AP20.9.15. Section 2332e of reference (ao), "Requests for Military Assistance to Enforce Prohibition in Certain Emergencies."

AP20.10. <u>TREATIES</u>

AP20.10.1. Convention on Early Notification of a Nuclear Accident (reference (dc)).

AP20.10.2. Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (reference (dd)).

AP20.10.3. Rio Declaration on Environment and Development (Rio Declaration) (reference (de)).

AP20.10.4. Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention) (reference (df)).

AP20.10.5. Convention on Environmental Impact Assessment in a Transboundary Context (reference (dg)).

AP20.10.6. Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Materials (1972 London Convention) (reference (dh)).

AP20.10.7. Applicable Status of Forces Agreement.

AP21. APPENDIX 21

LOGISTICS RESOURCES

AP21.1. HARVEST EAGLE AND HARVEST FALCON KITS

AP21.1.1. HARVEST EAGLE and HARVEST FALCON kits are air transportable operations support sets for supporting units that operate in remote locations where pre-positioning is not politically or economically practical. The kits include tents, field kitchens, cots, and similar housekeeping items. Additional equipment includes generators, TF-1 lightcarts, shower and laundry facilities, water storage bladders, and water purification equipment. The kits do not include vehicles, personal equipment items (such as parkas, bedding, or sleeping bags), or expendables (such as food, fuel, or medical supplies). HARVEST EAGLE and HARVEST FALCON kits are designated war reserve materials and maintained in a ready-to-deploy status in the CONUS by the 49th Material Maintenance Group, Holloman AFB, NM. These kits are under the operational control of HQ ACC/Logistics Plans.

AP21.1.2. Each HARVEST EAGLE kit may support 550 people, while the HARVEST FALCON kit may support 1,100 people. Each total kit may be transported on 14 C-141B aircraft. Kits are configured in four separately deployable packages, each designed to support 275 people. If HARVEST EAGLE or HARVEST FALCON kits are required at an accident scene, the on-scene staff must make arrangements for personnel to unpack and assemble the equipment, and to manage billeting space and operate the field kitchens. Special teams, such as USAF Prime BEEF and Readiness In Base units may be requested to provide additional support.

AP21.1.3. HARVEST EAGLE and HARVEST FALCON kits are designated war reserve material and are maintained by the ACC, and the USAF Commands in Europe and the Pacific. Number of kits per command varies.

AP21.2. PERSONAL PROTECTIVE CLOTHING SOURCES

AP21.2.1. Either permanent or disposable personal protective clothing is used for nuclear accident response.

AP21.2.2. Disposable Personal Protective Clothing. Sources for disposable personal protective clothing are:

AP21.2.2.1. DA Services, Inc., Defense Apparel
247 Addison Road
Windsor, CT 06095
Phone: (800) 243-3847
Fax: (860) 688-5787
www.daway.com

AP21.2.2.2. Lancs Industries, Inc.
12704 NE 124th Street
Kirkland, WA 98034
Phone: (425) 823-6634
Fax: (425) 820-6784

AP21.2.2.3. Norvell
164 Edgewood Street
Alexandria, TN 37012
Phone: (615) 529-2855
Fax: (615) 529-2853

AP21.2.2.4. RSO, Inc.
P.O. Box 1526
Laurel, MD 20725-1526
Phone: (301) 953-2482
Fax: (301) 498-3017
www.rsonic.com

AP21.2.2.5. Vallen Safety Supplies
5551 Midway Parkplace, NE
Albuquerque, NM 87109
Phone: (505) 344-6631
Fax: (505) 344-0301
www.vallen.com

AP21.2.2.6. FRHAM Safety Products, Inc.
P.O. Box 3491
Rock Hill, SC 29732
Phone: (803) 366-5131
Fax: (803) 366-2005
www.frhamsafety.com

AND

P.O. Box 101177
Nashville, TN 37224
Phone: (615) 254-0841
Fax: (615) 726-2514

AP21.2.2.7. Durafab Disposables, Inc.
P.O. Box 658
Cleburne, TX 76031
Phone: (800) 255-6401
www.k-caway.com

AP21.2.3. Permanent Personal Protective Clothing. NSNs for permanent personal protective clothing are shown in table AP21.T1.:

Table AP21.T1. Permanent Personal Protective Clothing NSNs

ITEM	**SIZE**	**NSN**
Coveralls, Radioactive	Small/medium	8415-00-782-2815
Coveralls, Radioactive	Large/extra large	8415-00-782-2816
Hood, Radioactive Contaminant		8415-00-782-2808
Hood, M6A2		4240-00-999-0420
Gloves, Cloth		8415-00-634-5026
Glove Shells, Radioactive Contaminant	8 through 10	8415-00-782-281 through 8415-00-782-2814
Shoe Covers	Small through extra large	8430-01-712-2872 through 8430-01-721-2876
Overshoes, Combat	Small	8430-01-048-6305

AP21.3. CONTAMINATED CLOTHING LAUNDERING FACILITIES

Commercial contaminated clothing laundry facilities may be used at various locations throughout the United States. The DoD JNACC helps identify any commercial facilities near an accident site.